FLIGHT

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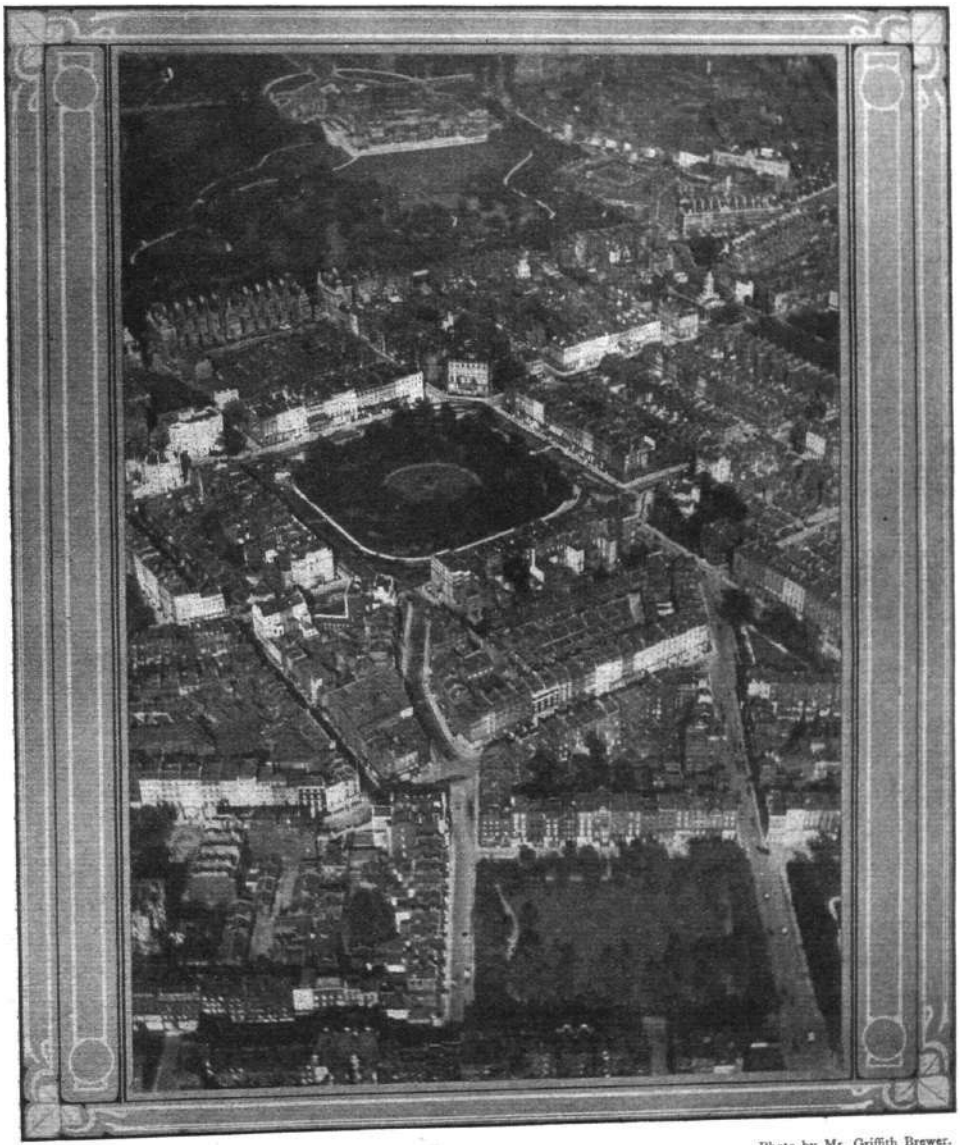


Photo by Mr. Griffith Brewer.

LONDON FROM ABOVE.—This week we publish above the first of a series of three remarkable photographs secured by Mr. Griffith Brewer from the balloon "Vivienne" during the International Balloon Contest in May, 1909.—The second and third photographs will appear in subsequent issues of FLIGHT, and with the above will make a striking group for framing. The square in the centre of the above picture is Belgrave Square, and Buckingham Palace can be seen in the far distance. In the foreground the central street is Cadogan Place, and the street on the right-hand side is Pont Street. This photograph was taken from a height of about 1,500 feet.

AN EARNEST OF THE FUTURE.

READERS of FLIGHT have not had long to wait for proofs of the arguments set forth in this column last week in favour of all-British competitions of much the same kind as the British Michelin Cup and the Baron de Forest £4,000 prize. We then, it will be remembered, urged the absolute necessity for a large number of purely British events of this character for next year, and pointed out that what was now sadly needed in order to assure success of the aeronautic industry in this country in the immediate future, was almost wholly and solely money—preferably forthcoming in the form of prizes for British aviators only and for machines built in Great Britain alone.

As to the proofs of the enormous advantages of contests of this character, it is but necessary to point to the doings of Sunday last. That was virtually the first day on which attempts were made to win the Baron de Forest prize by a cross-Channel flight, the total length of which, including the overland portions at either end, should be of the longest distance. That day alone witnessed the grand performance of Mr. Thomas Sopwith from Sheppey right across into Belgium, and at the same time saw Mr. Cecil Grace make the same trip as far as Dover, while Mr. Grahame-White at least gave at Dover a demonstration on another all-British machine, even though the elements unfortunately led to a nasty accident. Measured as the crow flies, Mr. Sopwith travelled over 170 miles, including crossing the Channel, on a Howard Wright aeroplane, fitted with a British-built E.N.V. engine, and thus broke quite a number of important records. A finer all-round performance it would be difficult to imagine, in view of the state of the art at the present day, so that Mr. Sopwith, with Mr. Howard Wright's help, has done an enormous amount, even by this single performance, to raise the prestige of Great Britain in the eyes of the whole world as regards the science of aviation. Mr. Cecil Grace's attempt on his Short biplane was brilliant so far as it went, and was achieved at an enormous speed, while his descent at Dover was due to nothing more nor less than wise discretion due to unsuitable weather conditions.

As regards Mr. Grahame-White's accident, his Bristol aeroplane was apparently in no way at fault. Indeed, considering the treacherous nature of the wind and other details, it is hardly likely that any other machine would have fared better, even if as well. From some points of view, his escape was miraculous, and the mere fact that he is still determined to compete, and has arranged for another machine of the same make, indicates that he at any rate is convinced there is no defect in it.

Since Sunday, and up to the day of writing, the weather conditions have not favoured any further attempts. But several days still remain during which this prize, and also the British Michelin Cup, are open for competition, so that with any luck the benefit of these two all-British prizes may yet be increased many-fold.

Also bearing out our plea of last week for more financial aid to the movement in readiness for the coming year, we are glad to observe that the Royal Aero Club has been sending round to its members a circular, urging every existing member to persuade those of his friends who have not already done so to join this premier national institution. Even those who are not in a position to offer substantial money prizes of £100 or so can do a great deal by enabling the Royal Club to establish itself on a still firmer and more independent basis in the immediate future than hitherto. As is pointed out in the circular in question, the Club will next year have to carry out the International Race for the Gordon-Bennett Cup and also the contest for the great £10,000 *Daily Mail* prize, so that it behoves everyone who can afford the two guineas subscription and two guineas entrance fee to come forward now and swell the funds of the Club at the same time as securing for themselves the numerous benefits that directly accrue from membership.

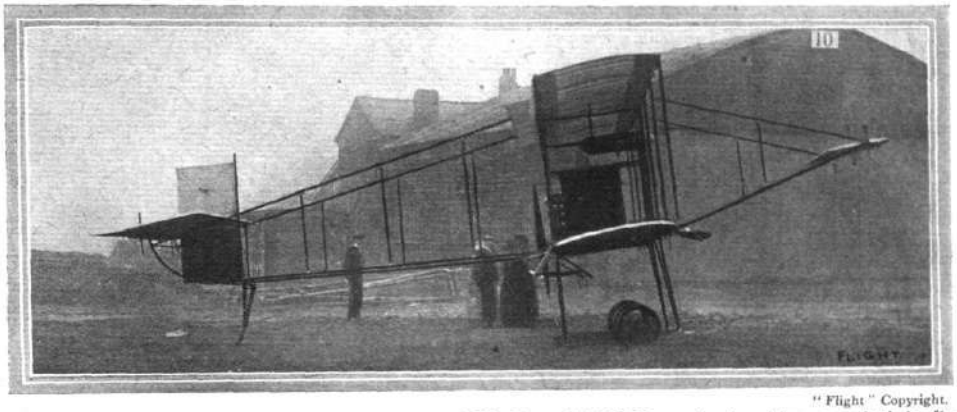
Yet one other development of the past fortnight may also usefully be referred to here, particularly as it has for its object the further direct advancement of aviation as regards the British Islands. We refer to the proposal that an Aeronautical Reserve should be founded in this country, and to the expressed determination of Mr. Grahame-White to use his whole endeavours to push forward this scheme. He has come back home from the United States full of the success which the Aeronautical Reserve is already meeting with out there, and anxious both by personal work and by his own resources to assist in bringing to fruition a similar British scheme. It is evident that no great difficulty is likely to be experienced in pushing the matter through, and indeed, the Royal Aero Club have, we observe, already appointed a special committee to confer with the military and naval authorities as to how best this may be carried through. The Aeronautical Reserve in the United States was founded on the ground that "the vulnerable area of their country now extends over every acre of her territory," instead of merely at certain points along the seaboard and the frontier, so that "steps ought to be taken to establish a national organisation of trained aviators ready to serve their country at a moment's notice, if necessary, and thoroughly equipped for the purpose well in advance." Out there the scheme has received Government recognition, both from the Navy and from the War Departments, while the general principles upon which the Reserve is being organised is that virtually any professional men or sportsmen interested in aeronautics can join, either as active members paying an annual fee of two dollars, or as an apprentice-member at half that rate.

In view of the admirable start that has been made in the United States, it ought not to be at all difficult for a very similar Reserve—suitably modified for the individual requirements of this country—to be instituted with very little delay and in a thoroughly efficient manner over here. Already as regards the national aeronautical institutions, and as regards the military and naval authorities, we believe that the possibilities of some such scheme as this have been more or less thoroughly thrashed out for some little time. Now, therefore, that the most active of the British flying men are keenly anxious to lend their aid, it ought to be the simplest matter in the world to get to work at once.

Sufficient, however, has now been said to indicate that there is a vast task ahead for all those connected in any way whatever with the aeronautical movement. All that is really needed most is keenness and determination, for these cannot but lead to the provision of the necessary preliminary funds. Otherwise everything is ready in this country to go right ahead and to ensure for the British industry a place well in the forefront.

THE HOWARD WRIGHT BIPLANE.

ALTHOUGH at the first Flight Show held at Olympia in 1909 Mr. Howard Wright showed a biplane which was noteworthy for some very interesting points, both in design and construction, most of the successes attained up till quite recently with machines made



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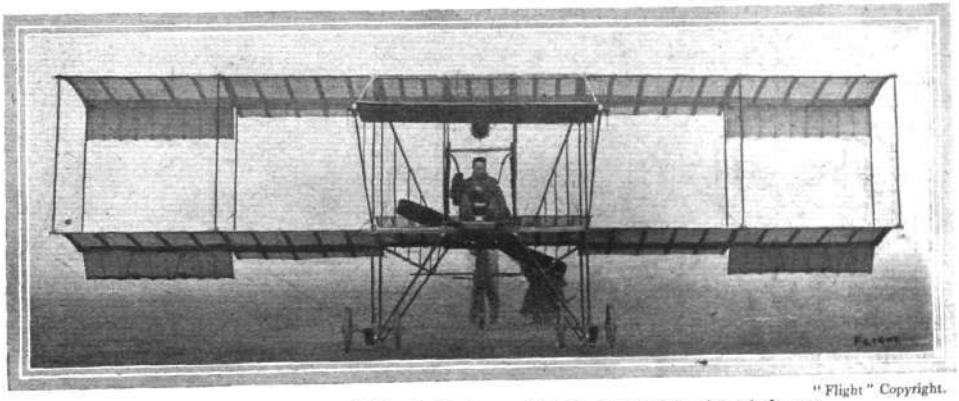
THE HOWARD WRIGHT BIPLANE.—Side view of Mr. Sopwith's E.N.V. engined machine, on which he flew from the Royal Aero Club's Eastchurch grounds to Belgium on Sunday.



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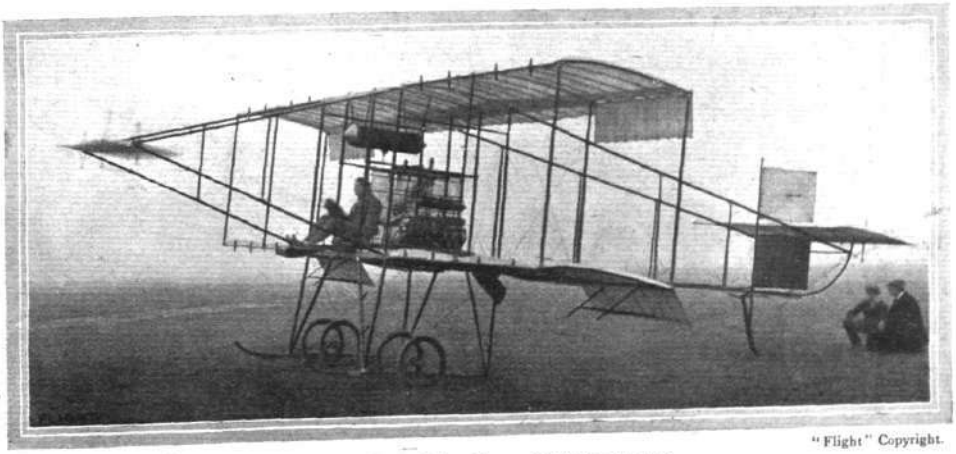
Front view of the Howard Wright biplane, with Mr. Sopwith in the pilot's seat.



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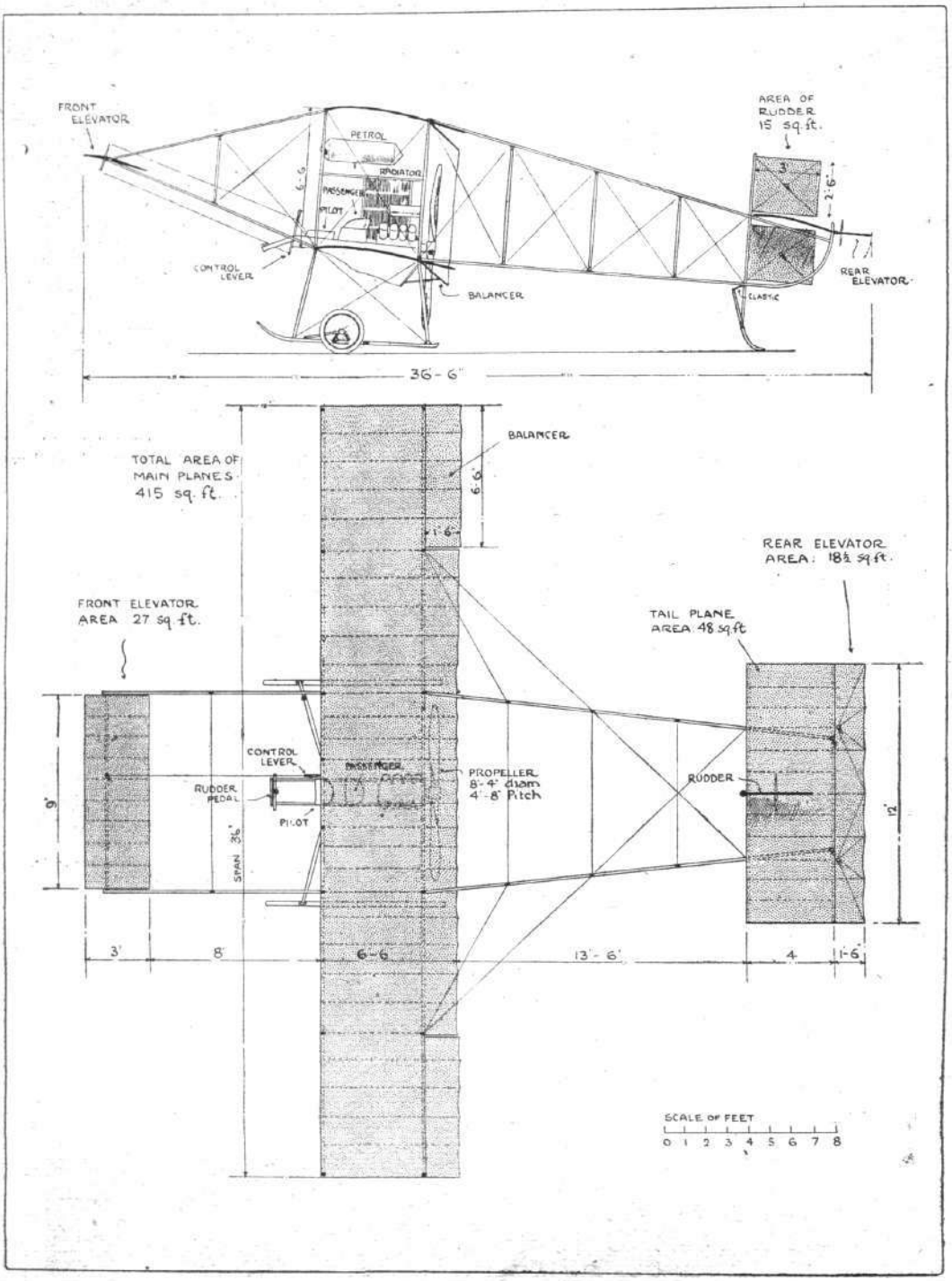
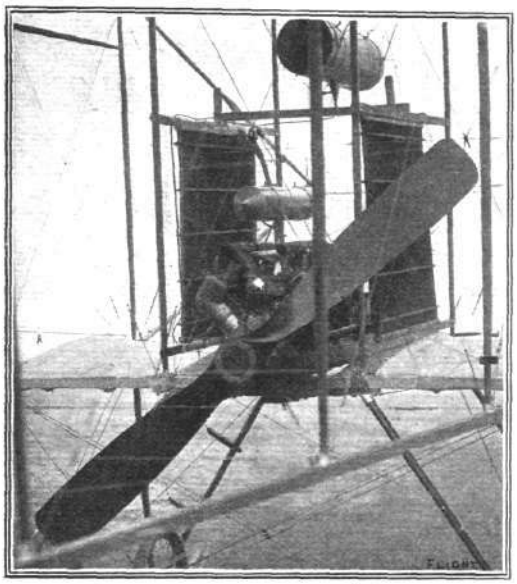
Half-side view of the Howard Wright biplane.



THE HOWARD WRIGHT BIPLANE.—Elevation and plan to scale.



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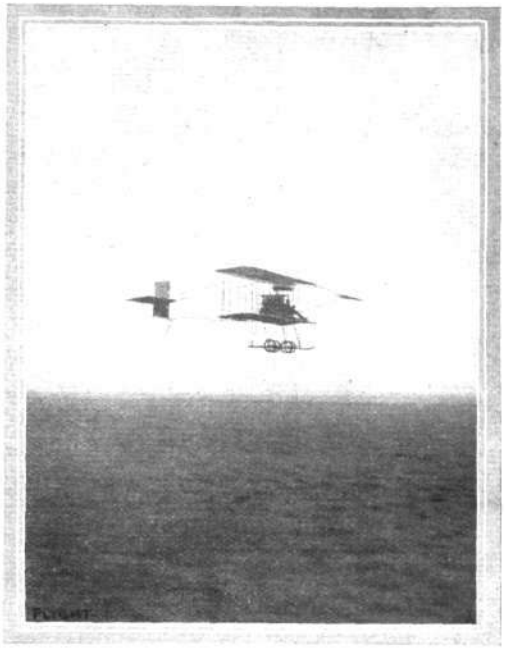
View from behind of the central portion of the Howard Wright biplane, showing the propeller, E.N.V. engine, Spiral Tube Co.'s radiators, &c.



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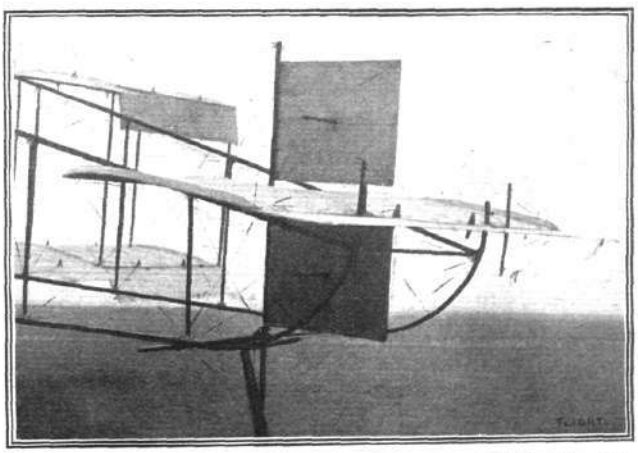
Mr. Sopwith in flight in the mist on his Howard Wright biplane.

by Mr. Wright were accomplished on monoplanes. It will be remembered, however, that after quiet but persistent work the Howard Wright biplane came into prominence again at the end of last month, when Mr. Thomas Sopwith succeeded in setting up new British duration and distance records at Brooklands. He then covered 107¾ miles in 3h. 12m. 55s., but this performance, splendid as it was, Mr. Sopwith completely eclipsed on Sunday last, in his magnificent attempt to win the Baron de Forest prize, details of which are given elsewhere in this issue. In view of the extraordinary success attained with the machine, which by the way is entirely British built, we have no doubt that the description of it which we give below, as well as the photographs and scale drawing which clearly show the construction, will be appreciated by our readers. From a glance at the series of photographs of the complete machine, it will be noticed that superficially parts of it bear some resemblance to other well-known and successful machines, but when one comes to examine the details of construction, it is seen that considerable originality has been incorporated in the design. Although the span is fairly large, being 36 ft., the machine has the appearance of lightness and yet the construction is very strong. The main planes are single surfaced, and both are fitted with hinged flaps for maintaining lateral stability. The planes are placed 6 ft. 6 ins. apart by means of eight pairs of struts fitting into lugs on the main spars. One of these spars forms the leading edge of each main plane, while the other is placed approximately 5 ft. further back. These spars are rectangular in section, and are strengthened by a system of wire bracing similar to that which is a feature of the Sommer machine. As can be seen from the photograph taken from the front of the machine, the ribs of the main planes are placed equidistant, and enclosed in pockets made on the upper side of the fabric. A single elevator is mounted on a triangular outrigger in front, and it is inter-connected with the elevating flap at the rear end of the fixed tail. The elevator is regulated by the single control lever, which has a dual function, for besides controlling the elevator it also regulates the balancing flaps at each end of the main plane, a backward and forward movement being required for the former and a sideways adjustment for the latter. The tail consists of a horizontal rectangular fixed plane having an area of 60 sq. ft., and, as we have said, to the rear edge of it is hinged an elevating flap. Above and below this tail plane are arranged vertical rudders, each of them being of a similar size, and controlled by a bar worked by the pilot's feet. Each side of the elevator outrigger framework, which runs from the main spars of each plane, is braced by a single strut.

The framework carrying the tail, which runs out from the rear spars, is braced by four pairs of struts, and at the after end is a cross-bar carrying a pillar, on which the two vertical rudders are hinged. For protecting the after part of the machine from damage when landing, or when running over rough ground, a single-plane skid is hinged at the bottom of this central pillar, to which it is flexibly anchored by means of elastic. Should the shock be more than this simple device will absorb, the end of the framework is bent round to form a skid, and this should prove equal to the task. The chassis consists of two pairs of wheels mounted on short skids attached to the



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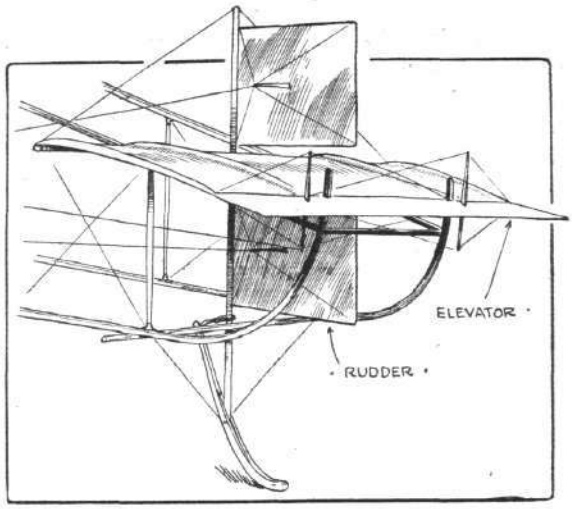
Tail details of the Howard Wright biplane.

main frame by continuations of the third pair of struts from each end, while additional struts from the central pairs of struts make the construction amply strong. Throughout the machine lugs are used for connecting up the various parts of the framework, and wire bracing is utilised freely to give added strength. In the scale drawing we have not included all these wire stays, as this would tend to confusion, but we have simply given the leads of the main bracing and connecting wires. Those who wish, however, for details of the various parts will be able to follow them by aid of the photographs. The engine and seating accommodation form one unit, being mounted on a couple of stout beams which are clipped to the main spars of the lower frame. It will be noticed, however, that the two radiators, which are by the Spiral Tube Co. and specially light, are separate, being clipped to the two central pairs of struts, while the petrol tank is slung from the top spars, the lubricating oil tank being mounted above the engine. As it is necessary for machines competing for the Baron de Forest prize to be entirely British-built, the engine is one of the latest E.N.V. type, of 60-h.p., which have been specially built in this country. It has eight cylinders arranged V-fashion, and Mr. Sopwith states that it went through its arduous trial without a falter, and in fact that he could have gone on for a much longer time had he so wished. This engine was described in our issue of October 15th last, and our readers will remember that the bore and stroke is 105 mm. by 110 mm., and that a special feature of the construction is the use of electrolytically deposited copper water-jackets. In connection with the engine, it is interesting to know that the complete power plant, including the accessories such as radiator, water, &c., weighs just over 400 lbs., and as Mr. Sopwith was carrying sufficient petrol and Vacuum oil for six hours, his trip was practically equivalent to one made with a passenger on a machine fitted with the lighter air-cooled rotary motor. Mr. Sopwith's machine has, as our readers will remember, shown itself very capable as a passenger carrier, Mr. Sopwith having made quite a feature of this side of his work at Brooklands. The machine is fitted with a Howard Wright propeller of 8 ft. 4 in. diameter, having a pitch of 4 ft. 8 in. The pilot's seat is placed above the lower front spar, while behind it, and arranged a little higher, is the second seat, for the passenger. The cross-beams are carried out



Sketch of the tail of the Howard Wright biplane showing elevator and rudder.

in front to form a foot-rest, and on the board between his feet Mr. Sopwith fitted a compass to aid him in his cross-country journey. It is instructive to note, in regard to the compass, that during the cross-Channel flight the needle persisted in sticking at one point, so that the aviator was forced to rely upon the sun for guiding him on his way until that, in turn, hid itself.

HONOURING MR. CLAUDE GRAHAME-WHITE.—Presentation to him last week, by Lord Roberts, on behalf of the Aerial League of the British Empire, at the Waldorf Hotel, of the League's special Gold Medal in appreciation of his win in the Gordon-Bennett Cup Contest.

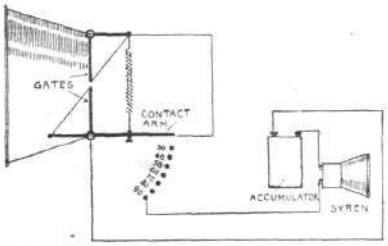
FLIGHT

SPEED-ALARMS FOR FLYERS.

SOME MORE COMPETITIVE DESIGNS FOR OUR £5 PRIZE.

[34] Herewith please find design for speed alarm for aeroplanes.

The device consists of two wind gates enclosed in an air tunnel and kept in the normal closed position by the adjustable spiral spring shown. As the speed of the aeroplane increases the wind will tend to open the gates, and in so doing will move the contact arm over the electric contacts shown. The contacts are so arranged, as shown in detail, that by the insertion of a plug any contact may be made alive at will and so suit the particular machine or the pilot. The other essential part of the apparatus



consists of a 6 volt accumulator and electric siren, the latter being placed close to the pilot, so as to ensure its being heard above the noise of the engine, &c.

On the machine being flown the wind gates would open and the contact arm move over the contacts, and if the speed was increased would at last come to the premeditated stop and sound the siren, and owing to the plug would be unable to move over this stop, so the siren would continue to give warning until the speed of the aeroplane was decreased.

The contacts would be marked as shown in m.p.h. and the plug placed in the speed desired.

Derby. GEO. DEARLE.

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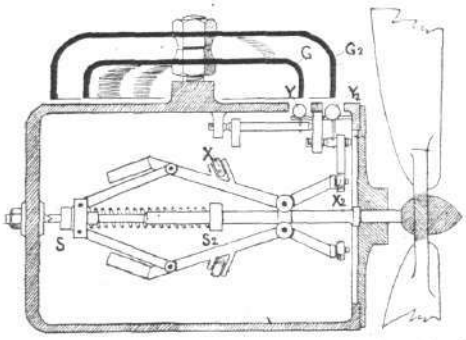
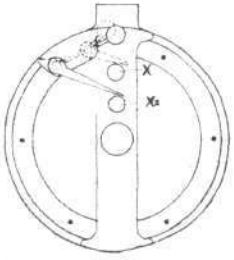
[35] The instrument which is shown in the accompanying drawing is one designed to safeguard an aviator from the dangers of excessively high or excessively low speeds of travel through the air.

The warning is effected by means of two bell alarms; one of high pitch, denoting dangerously high speed, and one of lower tone, denoting dangerously low speed.

The instrument consists essentially of a spring-loaded governor carried on the central spindle, and driven by means of the external fan.

The speed of rotation of the governor is thus directly proportional to the rate of travel of the aeroplane. As the speed increases the





governor-links fly out by centrifugal force, causing the roller, X, to approach the alarm-tappet, Y, and at the same time causing the roller, X_2, to recede from the tappet, Y_2. At ordinary speeds, therefore, the governor is revolving freely. At dangerously high speeds the roller, X, engages with the tappet, Y, as in view, causing the alarm-gong, G, to sound. At dangerously low speeds the roller, X_2, engages with the tappet, Y_2, causing the gong, G_2, to sound. The governor is shown in this latter position in view.

The governor spindle is provided with two stops, S and S_2, and is mounted centrally with the main casting, of which an end view is given in view.

The stop, S, provides an adjustment for the initial compression of the governor spring, while the stop, S_2, prevents the governor links from closing too far at low speeds of rotation.

A feature of the instrument is that the main casting carrying the complete mechanism may be quickly withdrawn from the casing for inspection or cleaning. To do this it is only necessary to take out the two screws.

The details of construction are shown as far as possible in the drawing, the details of the governor links being given separately.

Forest Hill. L. C. KEMP.

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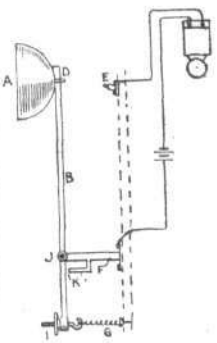
[36] I enclose a rough drawing and particulars of an aeroplane speed alarm. The action is as follows:—

A, aluminium cup for receiving air pressure; B, brass rod pivoted at J; C, combined electric bell and dry battery which can be fixed near the aviator; D, brass screw projecting about a $\frac{1}{4}$ inch from B; E, insulated brass point; F, bracket holding B; G, small steel spiral spring; H, twin insulated copper wire; I, screw for adjusting tension of spring; K, stop.

When the aeroplane has attained sufficient speed the air-pressure on A will cause the points, D and E, to meet, and so cause the bell, C, to ring.



Redhill. L. WELLER.

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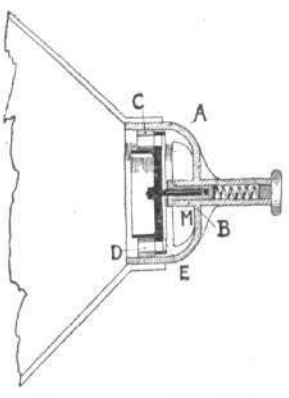
[37] The tube, A, has at one end a cross bracket, B, and is open at both ends.

Within the tube is an annulus, C, pierced with a number of circular slots, D, the closed spaces between the slots being of the same length as the slots.

The disc, E, is free to rotate when not bearing against the face of the annulus; this disc is pierced with corresponding slots, having in front of them, and fixed to the disc, sloping vanes, such that a current of air passing through the slots will tend to rotate the disc. The slots may be punched out on three sides, and the tongue formed (or part of it) bent out to make the vanes.

The forward face of the disc, E, is provided with a flange, passing through the centre hole of the annulus with as little clearance as



possible to prevent leakage; the outer rim of the disc is also broadened for the same reason.

The disc is carried by the spindle-bearing in the plug and thrusting at its flat end upon a steel ball; the steel spindle should be a free fit, and, as it is always under compression, it will not require a front bearing.

The brass plug fits freely into the tube, M, carried by the cross-bracket, B, and is capable of being pushed in by the amount of the clearance, $\frac{1}{32}$ in., or less.

The plug is pressed out by the steel spring, which is compressed by a distance-piece and the screw-cap.

The whole apparatus is provided with a collecting funnel, as indicated. Except where otherwise stated, the instrument would be made of aluminium.

The area of the interior hole of the annulus should be greater than the area of the open slots in the disc (in the tracing the areas are approximately 1·68 to ·73).

The disc will tend to come to rest with the slots open, as this is the position of least pressure; if owing to sudden fall in pressure it should stop with the slots closed it will creep round to the open position as the working pressure is reached.

The rotating disc should be quite true, fairly light, and have a high moment of inertia to steady the note, and also prevent it sounding with short puffs of wind, which though slowing the aeroplane would make the whistle suggest an increase of speed. It seems to me this might occur when descending in a spiral path, and coming round into the wind.

It is of no use relying much on the pitch of the note given; unless it is low and *soft*, it is generally a wild shriek, the presence or absence of which only can be taken as a sure index.

If two warnings are required two sirens giving different notes and sounding at different pressures is probably the safest; they can have a common collecting funnel, but it is not so good. Probably the best arrangement would be one sight and one sound indicator, as the sight indicator can be easily tested with the finger before starting to see that it has not stuck, and would serve therefore as a standby; this is not so with the sound instrument.

If it is desired to make the instrument adjustable the distance piece and the screw-cap can be lengthened, and a sunk scale coverable by the screw-cap added.

The instrument can be tested upon a rotating arm.

A 4 ft. arm at 220 r.p.m. =60 m.p.h.

W. LANGDON-DAVIES.

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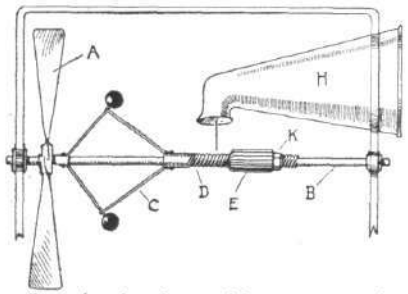
[38] Herewith design and description of a speed-alarm.

The complete absence of gearing, the compactness of the device, the ease of adjustment to any required speed, and the probable reliability of action, are points advanced in its favour.



If the sails revolve, the other revolving parts must of necessity work in unison, accurately and smoothly.

The sound produced by the contact of the needle and fretted collar will be immensely accentuated by the medium of the megaphone to which the needle is attached.

Parts.—A, windmill blades; B, spindle; C, springs and weights, actuated by centrifugal force; D, cylinder, threaded externally; E, fretted collar, steel; K, locking-nut; H, megaphone funnel, metal, carrying a thin metal disc, supporting needle, designed to vibrate freely.

Action.—Rotary force causes the weights to fly outwards, drawing cylinder, D, along spindle, B, until having attained the requisite speed, serrated collar, E, comes into contact with needle. The vibration of the disc supporting needle produces a musical sound of surprising volume. The object of the locking-nut is to adjust the serrated collar for any required velocity.

Cambridge. W. J. STALLAN.

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[39] The accompanying drawing shows a device which, when attached to an aeroplane in such a position that it is exposed to the wind, will warn the aviator whenever his machine may be exceeding the maximum, or be falling below the minimum, of certain pre-arranged maximum and minimum wind speeds, the device being so arranged as to emit a high or low note to indicate the maximum and minimum limits respectively.

Principle.—An ordinary whistle, if blown into, will only sound if the holes provided for the escape of the imprisoned air be open.

In the above device such a whistle is provided with a funnel-shaped mouth to receive the air, and a disc is so arranged that the pressure of the wind, normal to its surface, will, on reaching a certain pre-determined maximum value, force the disc back against the action of a spring to such a distance that it uncovers the ports arranged on the whistle to permit the imprisoned air to escape, thus allowing the whistle to blow. On the wind pressure dropping below a certain pre-arranged minimum value the disc is forced forward by the spring to such a distance that another port, arranged on another portion of the whistle, is uncovered, thus again allowing the whistle to blow.

The device consists of a central brass tube, A, in one end of which

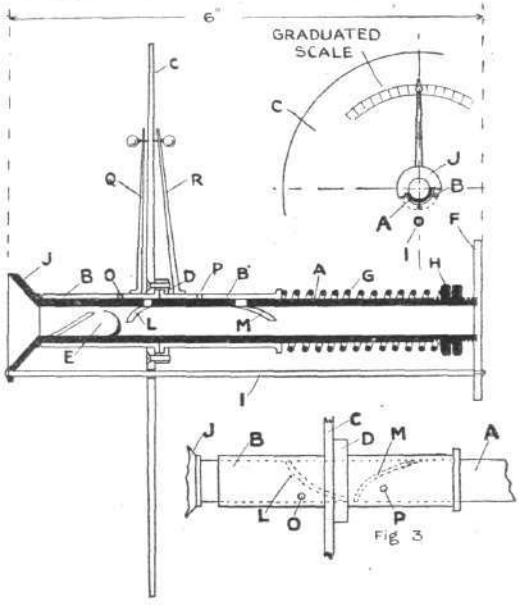


Fig. 3

is fixed the whistle, E, with funnel-shaped orifice, J, and which, at the other end, is soldered to a brass plate, F, for attaching to the aeroplane.

The sleeve, B, which is concentric with tube, A, and which slides over it, is formed of two pieces of brass tubing of equal length, with a flange on one end. These flanges butt together in the centre and are ground to a good fit. They are held together in this manner between the disc, C, and a separate recessed flange, D. The screws do not, however, pass through the flanges formed on the sleeves. The latter are thus free to revolve separately in either direction. The disc, C, is prevented from rotating by the small steel wire, I, which passes through a somewhat larger hole in the disc, and is securely fastened at both ends of the device. The disc, C, together with both portions of sleeve, B, can, therefore, slide along tube, A. This motion is opposed, however, by the compression in the helical spring, G. The tube, A, has two helical slots cut in it, as shown at L and M. The sleeve, B, which slides over tube, A, has two small holes drilled, one in each half, as shown at O and P.

From an inspection of the drawing, it will be readily seen that when the wind pressure reaches a value high enough to force the disc, C, back to such a distance that the hole, O, in sleeve, B, comes over the slot, L, in tube, A, a passage is opened up for the escape of the imprisoned air in the tube; hence the whistle will blow. It will also be seen that the further sleeve, B, is rotated in a clockwise direction, when viewed from the front, the further the disc, C, will have to be forced back by the wind to allow the whistle to blow. A pointer, Q, attached to the sleeve, B, moves over a scale arranged on the front of the disc, C, and graduated in m.p.h. By moving the pointer to different positions on the scale, the whistle may be adjusted to blow off at any desired maximum velocity.

From Fig. 3 it will also be noticed that immediately the wind pressure falls so low as to allow the hole, P, in sleeve, B^1, to come directly over a part of slot, M, a free passage will again be allowed for the air, and the whistle will again blow. Also the further this sleeve, B^1, is rotated in an anti-clockwise direction, viewed from the back, the lower the wind pressure will have to drop in order to allow the whistle to blow.

Attached to this sleeve is also a pointer, which may be moved over a similar scale as that for the maximum velocity, only situated on the back of the disc. This is to adjust the whistle to blow at any desired minimum velocity.

As the opening for the escape of the air at the minimum velocity limit is much further from the whistle itself than the opening when indicating maximum velocity, a much longer column of air is set in vibration. Hence a lower tone results.

Victoria, Australia. H. ERNST.

AEROPLANE SILHOUETTES FROM THE PARIS SHOW.

THE SOMMER MONOPLANE.

CONSTRUCTED at Mouzon, in the Ardennes, by Roger Sommer, whose biplane is already well known. Double-surfaced planes. Framework of wood. Has passed its trials satisfactorily.

General dimensions.—Length overall, 9 metres; width, 10·50 metres; bearing surface, 17 square metres.

Seating capacity.—One.

Engine.—50-hp. 7-cyl. air-cooled rotary Gnome.

Propeller.—Rapid, of two blades.

Chassis.—Similar to that employed on the Sommer biplane. Two wheels, connected by a steel axle and fastened by rubber springs to a simple wooden chassis, the lower members of which form two skids curving forwards and upwards. Under the tail is a curved wooden skid.

Tail.—Weight-lifting tail plane, the angle of which may be altered during flight by means of a series of rods and cranks leading to a small hand-wheel placed on the right side of the pilot. The elevator, which is hinged to the trailing edge of the tail plane, is divided into two sections, to admit of the single centrally-placed rudder working freely.

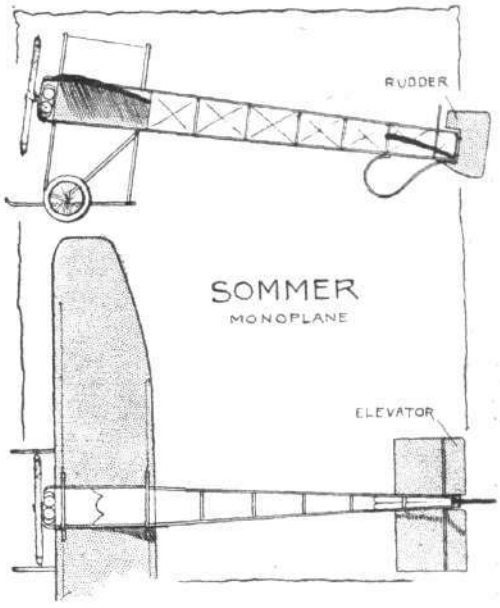
Lateral stability.—Maintained by the flexing of the trailing edges of the main planes.

Weight.—Complete with motor, 265 kilogs.

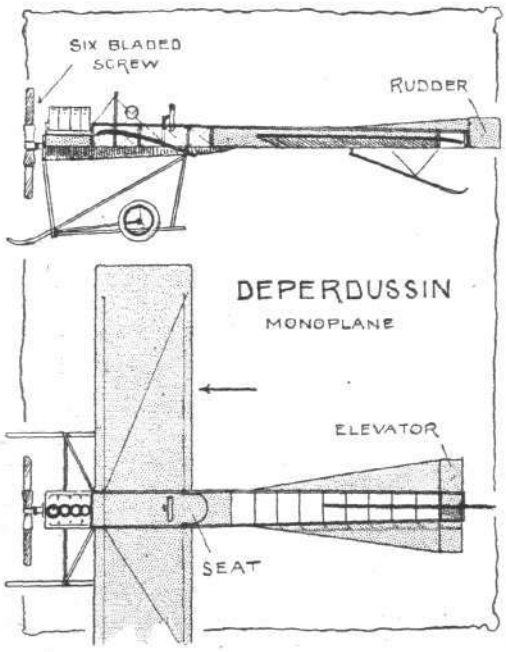
Speed.—90 kiloms. an hour.

System of control.—The sideway movement to the right or left of a single vertical lever controls the flexing of the wings, whilst the backward and forward movement of the same lever elevates and depresses the machine. Steering is controlled by a foot-lever. All control wires are duplicated.

Price.—Complete with 50-h.p. Gnome, 20,000 frs.



THE DEPERDUSSIN MONOPLANE.



A FRENCH-BUILT monoplane. Framework of wood. M. Busson, formerly a Blériot pilot of some distinction, has made many successful flights on this machine at Issy-les-Moulineaux, and he has announced his intention of using it in an attempt to fly from Paris to Brussels and back for the A.C.F. Grand Prix d'Aviation.

General dimensions.—Length overall, 9 metres; width, 9 metres; mean width of wings, 1·80 metres; bearing surface, 15 square metres.

Seating capacity.—One.

Engine.—50-h.p. water-cooled vertical 4-cyl. Clerget, or a 70-h.p. water-cooled vertical 4-cyl. Austrian-Daimler. Any motor fitted if desired.

Propeller.—Six-bladed Deperdussin propeller (Licence Rapid), driven at a speed of 1,400 revs. per minute. An ordinary two-bladed Deperdussin propeller is fitted on Busson's machine at Issy-les-Moulineaux.

Wheels and skids.—Two wheels and two skids, the latter members being somewhat similar to those employed on the Antoinette monoplane.

Tail.—Non-lifting tail plane (horizontal empennage). Single vertical fin placed centrally. Elevator divided in centre, is hinged to trailing edge of tail plane. The single rudder is placed centrally behind elevator.

Lateral stability.—Maintained by flexing the trailing edges of the wings.

Weight.—Complete with engine, about 280 kilogs.

Speed.—About 90 kiloms. an hour.

System of control.—The rotation to the right or left of a single wheel, mounted on a column in front of the pilot, flexes the wings for the maintenance of lateral stability. A backward movement of the entire column elevates the machine and *vice versa*. A foot lever controls the vertical rudder.

Price.—Not stated.

THE N.E.C. TWO-STROKE FLIGHT ENGINE.

AMONG the British-built engines that are being used in competition for the Baron de Forest all-British flight prize is an entirely new design of two-stroke petrol engine constructed by the New Engine (Motor) Co. at their Acton Hill works. For a long time past Mr. G. F. Mort, one of the directors of the Company, has been studying the very fascinating and very elusive problem of making a really satisfactory two-stroke engine; and at last, as the result of much perseverance, and incidentally the expenditure of much money, his firm has evolved an engine in which they have reason to feel the greatest confidence, both on the score of ability to compete with any four-stroke rival and also in consequence of its remarkably low factor of weight to power. The first of these engines has been fitted to Mr. Alec Ogilvie's Short-built Wright biplane with which he is competing for the Baron de Forest £4,000 prize.

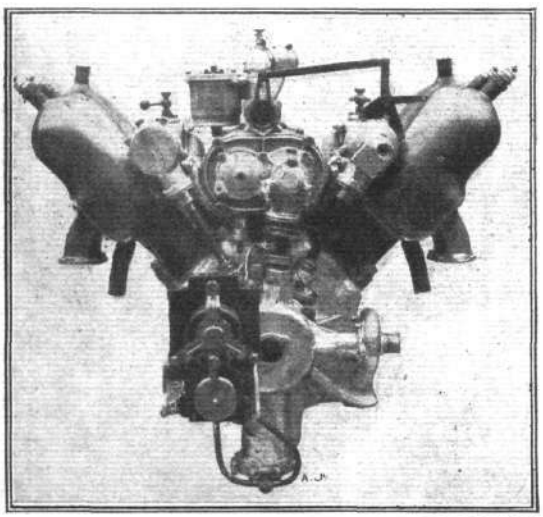
The accompanying illustrations give a general idea of the appearance of this latest N.E.C. development, which is, as will be observed, of the four-cylinder V type. It is capable of developing 50-h.p.; and the revolutions for which it is designed are 1,250 per minute. It is water-cooled, and the cast-iron cylinders have electrolytically-deposited copper water-jackets; while, although the bore and stroke of the cylinders are 3¼ ins. by 4½ ins. (93·5 mm. by 114 mm.), the weight complete is only 150 lbs., or, in other words, the engine only weighs 3 lbs. per h.p.

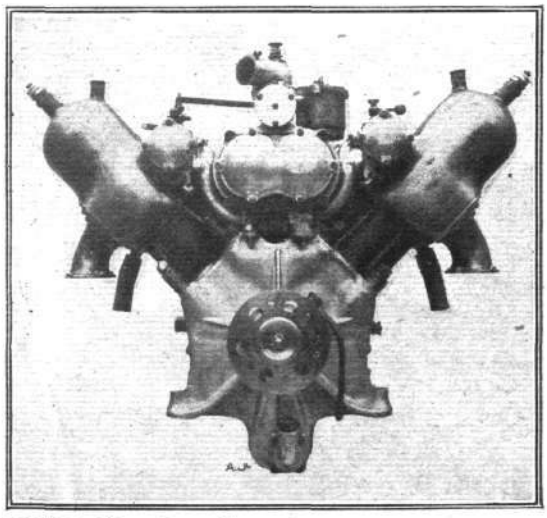
In working order for a five hours' flight, the estimated total weight of the plant is 220 lbs., allowing 55 lbs. for the water and radiator and 15 lbs. for the oil. On this basis the N.E.C. engine appears to justify its claim to be the lightest engine in the world for its power; and although it is at the moment difficult to give actual comparative figures it would appear to be an advance upon all others in this respect, mainly due to the difference in the weight of the lubricating oil required by it in comparison with engines of the rotary pattern. It is, at any rate, sincerely to be hoped that this new and extremely interesting flight motor will justify in actual practice all its makers' hopes, for if it does so it will not only put England in a unique and much to be desired pre-eminent position but it will have accomplished something of even wider importance, which is the opening of the door of progress for the two-stroke engine.

Hitherto the two-stroke engine has been a favoured theme of a small even if enthusiastic minority, and it needs just such a successful attempt as this which the N.E.C. have made in order really to raise the two-stroke motor above the somewhat indifferent level at which it has so long existed. The problem has, of course, a far greater fascination from its aspect in relation to aviation than from any other branch of engineering, for the fundamental importance of increasing the relationship of power to weight in flight engines, endows the two-stroke principle—in which the engine obtains an explosion every revolution instead of every second revolution per cylinder—with an irresistible fascination. Inasmuch as the firing stroke is the only stroke that does work in any engine, the possibility of doubling the number of working strokes in a given period of time essentially holds out the prospect of a possible 100 per cent. increase in the power available from a given weight. Of course, it is possible to increase the power of four-stroke engines by increasing the speed of revolutions, and it has been along these lines that the so-called small car of to-day has been made so popular in the automobile world. But, in aviation, high revolutions are rather disadvantageous because it essentially implies that gearing must be employed for driving the propeller, and in some types of aeroplanes, particularly the monoplane, this would involve a radical alteration in the general design. Essentially, therefore, the two-stroke principle must be regarded as a hopeful means of increasing the power for a given weight without increasing the revolutions; and as such it has an absolutely unique importance and interest to all who study the problem of flight.

There are certain problems associated with the two-stroke engine that are more or less familiar to most of those who have paid any attention to the technicalities of high-speed internal-combustion engines; and one in particular arises from a mechanical characteristic of the two-stroke motor that is popularly considered one of its best mechanical features. We refer to the fact that the two-stroke motor has no valves as ordinarily understood, the exhaust and induction being controlled by the piston itself, which uncovers slots or ports cut in the cylinder walls near the bottom end of the stroke. It is from this peculiarity that the two-stroke engine derives its fundamental claim to simplicity. But a little thought is sufficient to show that this advantage brings with it its own particular drawback due to the exhaust and induction taking place more or less simultaneously inasmuch as both the exhaust and the inlet ports must be open at the same time. In the first place there is some difficulty in getting rid of the exhaust gases quickly enough and completely enough so that they shall neither weaken the fresh charge nor pre-ignite it. There is also the difficulty of introducing the fresh charge effectively, and the further difficulty of ensuring that it shall not partially escape down the open exhaust-port.

Now it is in the solution of these two particular problems that the N.E.C. engine is more than usually interesting, and it is in getting the detail right that so much time and money had to be spent by the really plucky and persevering engineers who have devoted themselves to this particular task. As usual in two-stroke engines, the exhaust-port is cut higher up the cylinder than the inlet-port, in order that the products of combustion may escape more or less completely under such pressure as may then exist in the cylinder. Very quickly afterwards, however, the inlet-port is also uncovered by the piston, and it is then that the special characteristics of the N.E.C. motor come into play. In order to appreciate the exact significance of the N.E.C. design, it is necessary to bear in mind that the ordinary method of introducing the fresh charge is to use the crank-chamber as an intermediate receiver and to allow the pump-action of the piston to expel the charge from the crank-chamber into the



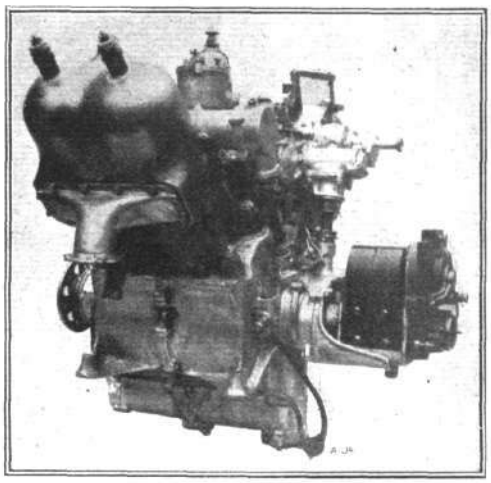


THE NEW N.E.C. TWO-STROKE MOTOR.—Views from either end.

cylinder. This crude method has many drawbacks, for it is under these conditions that the already mentioned disadvantages of the two-stroke engine manifest themselves.

In the N.E.C. motor the fresh charge is dealt with by a fan or blower, consisting of a pair of toothed wheels operating in much the same way as they do in oil pumps and water pumps on motor car engines, for which purpose they are frequently employed. The blower on the N.E.C. engine is divided into two parts, and one part deals exclusively with fresh, uncarburetted air. It is the air delivered by this part of the blower that first enters the cylinder when the inlet port is uncovered; and it is because this air is uncarburetted that it is capable of scavenging out the exhaust-gases without risk of flashing back or of causing waste of fuel owing to some of it finding its way down the exhaust-pipe. At a certain instant of time, which has had to be determined by experiment and is actually governed in practice by the action of a simple rotary valve, the second part of the blower delivers its explosive charge into the cylinder. From the mere fact that the exhaust-port commences to open before the inlet-port it is obvious that the exhaust-port must also remain open until after the inlet-port has closed, and that whilst the two ports are simultaneously open there is always the potential conditions for the escape of some of the charge unburned. But the lag in the introduction of the rich mixture coupled with the fact that the cylinder is already full of fresh air—forming a kind of cushion to the inrush of mixture—has been found satisfactorily to overcome this outstanding difficulty of the two-stroke problem, for we understand from the makers that neither is any gas lost at slow speeds, nor is any difficulty experienced in introducing full charges at high speeds.

The revolving valve to which reference has been made is just a plain cylinder revolving on ball bearings—duplicated in the case of a 4-cylinder V engine. It does not operate under excessive temperatures or pressures, and although it certainly is a valve it is hardly comparable with the gas-tight, ground valves used for four-stroke engines. Our illustrations serve to make it clear how the blower is placed centrally between each pair of cylinders, and how the revolving valves are interposed between the blower and each pair of cylinders. Also it will be observed that the blower and that each of the valves have independent enclosed shafts whereby they are driven from the crank-shaft.



Another view of the N.E.C. two-stroke motor.

LAST WEEK'S STORMS AND THE CROSS-CHANNEL FLYERS.—The wreck of Mr. Loraine's hangar and aeroplane on Saturday last at Dover. "Inspecting" the débris.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Committee Meeting.

A MEETING of the Committee was held on Tuesday, the 20th inst., when there were present:—Mr. Roger W. Wallace, K.C. (in the Chair), Mr. Ernest C. Bucknall, Col. H. C. L. Holden, R.A., F.R.S., Prof. A. K. Huntington, Mr. J. T. C. Moore-Brabazon, Mr. C. F. Pollock, Mr. Stanley Spooner, and Harold E. Perrin, Secretary.

New Members.—The following new members were elected:—
B. G. Benson. Commander A. Yeats Brown, R.N.

Next Committee Meeting.

Owing to the Christmas holidays. the next meeting of the Committee will take place on Tuesday, January 3rd, 1911.

Baron De Forest Prize.

Up to the 21st inst. Mr. T. Sopwith is the only competitor who has succeeded in crossing the Channel in connection with this prize. This flight ensures the prize of £4,000 being won, and unless the distance is exceeded it will be awarded to Mr. Sopwith. Ten days only remain between now and the closing of the competition, and Mr. Cecil Grace, Lieut. Watkins and Mr. Robert Loraine are all ready to start on the first favourable opportunity.

In order that the necessary arrangements may be made, other intending competitors are requested to notify the Secretary of the Royal Aero Club without delay when their machines will be ready for inspection, &c.

Eastchurch Flying Ground.

The road leading to the flying ground is now being made up, and will be finished shortly after Christmas.

If the weather is favourable, flights will be made there during the Christmas holidays. Mr. Robert Loraine proposes to make his start from Eastchurch for the Baron de Forest prize, and possibly attempts will be made to beat the record put up by T. Sopwith for the British Empire Michelin Cup.

Circular to Members.

A few days ago a circular was issued to all the members pointing out the desirability of increasing the membership of the Club. The Committee trusts that the present members will do all in their power to induce their friends to join.

Royal Aero Club Challenge Cup.

The Hon. Mrs. Assheton Harbord, accompanied by Mr. C. F. Pollock and Capt. Sartorius, made a balloon trip on Sunday, the 18th inst. Starting from Battersea at 2.10 p.m., they descended at 8.40 a.m. on the 19th inst, at Chartres in France, having accomplished a distance of about 350 miles, which is the longest so far recorded in the Competition.

Gordon-Bennett Aviation Cup.

The Cup, having been won this year by Mr. C. Grahame-White, the nominee of the Royal Aero Club, the race for 1911 will be held in England. The exact date and place will be announced later.

An Extraordinary Conference of the Fédération Aéronautique Internationale will be held in Paris on January 10th to determine the special regulations to govern the contest for 1911.

Each Club forming part of the Fédération Aéronautique Internationale has the right of challenging the holder, the Royal Aero Club, and such challenge must be received before March 1st, 1911.

The Committee of the Royal Aero Club will select the three competitors and reserves representing the United Kingdom. Intending competitors are requested to notify the Secretary on or before February 28th, 1911, of their willingness to compete if chosen. Applications must be accompanied by a cheque for £20, the entry fee, which amount will be returned should the competitor not be selected.

Candidates must be members of the Royal Aero Club.

British Empire Michelin Cup.

Intending competitors are again reminded that the competition for this year closes on the 31st inst. Full particulars can be obtained from the Royal Aero Club. The best performance so far recorded is by T. Sopwith, 107¾ miles.

Rolls Memorial Fund.

Members who have not yet sent in their contributions to the above Fund are requested to do so as early as possible. By limiting individual subscriptions to the sum of 10s. the Committee hope they will receive the support of all members.

It has been decided that the Memorial shall take the form of an **Aeronautical Library** at the **Royal Aero Club**, to be called the **"Rolls Memorial Library."**

Contributions of books to the **"Rolls Memorial Library"** will also be greatly appreciated.

In addition to the names already published, the following members of the Royal Automobile Club have kindly contributed to the Fund:—

Charles F. T. Swan
Wm. H. Dolphin
Henry Webley
V. Ker-Seymer
E. H. E. Hensley
Murray Griffith
T. Clarkson
A. Gollin
C. L. E. Geach
H. L. Fraser
F. Whiteley
J. Shorland Aplin
Capt. R. French-Brewster
Herbert S. Stoneham
Paul A. Rubens
Henry Bowlby
A. E. Berriman
Euston A. Salaman
W. E. Rowcliffe
J. Cartier
Frank Hedges Butler
Lord Montagu of Beaulieu
S. Twining
F. M. Green
C. Bartholomew
Herbert E. Seligman
O. E. Mocatta
Charles Hardy
J. de Castro
Gaston de Castro
Patrick King
Maj. G. H. J. Skeffington - Smyth, D.S.O.
Capt. E. A. Digby
J. Charlton Humphreys
F. Lamplough
E. Keynes Purchase
Sir W. B. Barttelot, Bt.
Vice-Admiral Sir George Neville, K.C.B., R.N.
Capt. O. H. Bayldon
G. Holt Thomas
Hilton A. Fulcher
Claude Johnson
T. Sopwith
D. J. Lockhart Anderson
H. E. Tyser
W. J. Adams
Dr. H. E. B. Bruce-Porter
Sir Henry Norman, M.P.
Reginald H. Loder
Sir C. D. Rose, Bt., M.P.
Sir David L. Salomons, Bart.
B. Oppenheimer
Roy Lewis
Edgar O. Turnbull
H. W. Styles
A. C. C. Schultz
F. J. Wootton Isaacson
E. Perronet Sells
Alexander Johnston
Charles Walker
E. M. C. Instone
Berkshire Automobile and Aero Club
Maj. W. E. T. Bolitho, D.S.O.
Henry Edmunds
G. W. Beldam
G. Cecil Whitaker
Arthur Gibbs
E. A. Claremont
F. Smith
J. E. Hutton

International Aero Exhibition at Olympia.

The International Aero Exhibition held by the Society of Motor Manufacturers and Traders under the auspices of the Royal Aero Club, will take place at Olympia, opening on Friday, March 10th, 1911, and terminating Saturday, the 18th.

Full particulars can be obtained on application to the Exhibition Manager, Society of Motor Manufacturers and Traders, Maxwell House, Arundel Street, Strand, London, W.C., or the Secretary Royal Aero Club, 166, Piccadilly, London, W.

In connection with the Exhibition it is proposed to organise an exhibit of model flying machines. Space will be given free, and the Royal Aero Club will erect suitable stands and provide the necessary attendants. In order to partly cover this expense a charge of 10s. will be made for each model exhibited. It is proposed to award Medals and Cash Prizes.

New York Aviation Meeting.

The Extraordinary Conference of the Fédération Aéronautique Internationale to consider the protest of Mr. C. Grahame-White in connection with the Statue of Liberty Prize, will be held in Paris on January 10th, 1911.

Aviation Lantern Slides.

The Royal Aero Club have now acquired a large collection of lantern slides dealing with aviation, and members can hire these at a fee of £1 1s. for a period not exceeding three days. They include all the latest machines and pictures taken at aviation meetings in England and abroad. Application for hire should be made to the secretary.

HAROLD E. PERRIN,
Secretary.

166, Piccadilly.

PROGRESS OF FLIGHT ABOUT THE COUNTRY.

NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.

Aero Models Association (CAXTON HOUSE, WESTMINSTER).

A SOUTH Metropolitan branch has now been formed, with Mr. A. C. Horth as chairman and Mr. W. H. Ransley as honorary secretary. A successful exhibition of members' models was held in the Central Hall, High Street, Peckham, on the 14th inst. Arrangements are in hand for a flying meeting to be held on Saturday next.

The question of forming a South-west Metropolitan branch is also under consideration. and those who are interested in this project are asked to communicate with the secretary.

Bristol and West of England Ae.C. (STAR LIFE BLDGS., BRISTOL)

ON Saturday, the 17th inst., a fair muster of the members of the club motored out to Keynsham to commence gliding operations. This was the first opportunity the members had of testing the new glider which has been presented to the club by the British and Colonial Aeroplane Co., of Bristol.

Unfortunately the weather was not all that could be desired, and the conditions were unfavourable for carrying out experiments on an extended scale, the surface of the ground being so wet and soft that it handicapped the members during the starting operations.

The glider was brought out of the hangar and much admired, it being beautifully constructed and fitted with all the latest improvements. The machine is of the biplane type and so constructed that it can be fitted with engine, propeller and chassis. The main planes have a span of 32 ft. 4 ins., and the overall length from elevator to tail is 33 ft. 10 in. The height to the top of the planes is 6 ft. 8 in. The control of the elevator and tail is by means of forward and backward movement of the hand lever, and the control of the ailerons by moving the same lever to the right or left, whilst the rudder is worked by a foot lever. A detachable chassis has been supplied on which the glider can be mounted for pulling it up the hill.

The ground, which is situated near Keynsham, is almost ideal for gliding purposes. The aspect is north-west, and on the top of the hill there is a slight decline for 20 yards of about 1 in 12, then the hill suddenly dips for a distance of 100 yards at a decline of about 1 in 4. At the bottom there is a flat piece of land extending for about another 150 yards, which makes a good landing place, the width of the ground being 120 yards.

The glider is kept in the hangar which has been erected by the club at the foot of the hill.

After the glider had been photographed it was taken a short distance up the hill, and an endeavour was made to fly the machine as a kite. Ropes were attached to the two outside corners of the main planes, and two members towed the machine down the hill, but owing to the lack of wind the machine only lifted a couple of feet off the ground. The next attempt, however, was far more successful, and the glider was taken up to the top of the hill, and on being towed quickly down it rose to a height of about 12 ft., and would undoubtedly have flown higher had the tow ropes been longer. It was then decided to take the glider to the top of the hill, and see if it would fly with a passenger. Mr. G. H. Challenger took his seat in the machine, and two of the members towed the machine down the hill. The wind, however, had dropped considerably, and was insufficient to lift the machine more than two or three feet from the ground. However, the glider descended safely, and there is no doubt whatever that with sufficient wind the machine will be capable of gliding with a passenger.

By this time the rain had commenced to fall and the light was failing, so it was decided to give up operations for the day. The glider was taken back to the hangar, and the members were quite satisfied with their first attempt, and expressed the hope that they would soon be able to have another opportunity of using the machine.

Wednesdays and Saturdays will be general club days for gliding, but no further trials will be made until Saturday, December 31st.

It is hoped that next year the membership of the club will be considerably increased, and the honorary secretary (Mr. A. Alan Jenkins), Star Life Buildings, Bristol, would be glad to receive the names of any gentlemen who would like to join.

A Model Club in Johannesburg.

WE learn from Mr. E. H. Goldstein that, following on the announcement in FLIGHT some time ago, a model aero club has now been started in Johannesburg. He would be greatly obliged if makers of models and accessories and materials would send him their price lists, to Klein Street, Johannesburg, for the use of members. He also informs us that a company is being formed in the district for giving exhibition flights, and the aviator and manager will be Mr. Breunpetand.

Coventry Aeroplane Building Society (22, KINGSTON ROAD).

A VERY good number of people were present at the inaugural meeting of this Society held at Coventry on the 15th inst. Officials were elected as follows:—Mr. S. Weaver, President; Mr. J. Lewis, Vice-President; Mr. H. M. Carter, Treasurer; Mr. J. W. Schofield, Hon. Sec.; Mr. Bert Burrow, Assistant Hon. Sec.; with Messrs. J. E. Overton, S. Liggins, Derbyshire, Fox, Ralph, Blair and Voicey as Committee. An entrance fee of 2s. 6d. was decided upon, while the subscription has been fixed at 2d. per week so as to make it within the reach of all. Prizes have already been offered by the President and Treasurer, while Mr. Voicey has placed at the disposal of the Society a large workshop in Cambridge Street. Arrangements are in hand for the holding of an exhibition of models, &c., and Mr. S. Weaver has consented to show one of his full-sized machines with the engine in motion. It is hoped that artisans especially will join the Society, which aims at helping them to evolve their ideas to something practical.

Midland Aero Club (GRAND HOTEL, BIRMINGHAM).

THE second annual dinner of the Midland Aero Club was held at the Grand Hotel, Birmingham, on Saturday night last. Mr. Ebenezer Parkes, M.P., presided, and among those present were Councillor Norris (Deputy Mayor of Sutton Coldfield), Mr. G. Dennison (hon. secretary), Mr. H. A. Pepper (hon. treasurer), and Capt. Cooke.

In proposing the toast of "The Club," Mr. E. Parkes, M.P., said anyone interested in the science of aviation must recognise that it had come to stay in relation to sport, business and war. It was for us to see that we did not take an inferior place in the development of the science. Germany and France were devoting infinitely more in resources of men and money towards this object than we were, and he could not but come to the conclusion that we were behindhand. The chief purpose of a society like the M.A.C. was to arouse local interest in the question, and doubtless it would do a great deal towards removing the supineness and indifference of the public to the progress of aviation. There had not been a first-class war between any of the great powers in Europe for a long time. If this country were suddenly to be engaged in war, and was unprepared to meet attacks from the air, they would stand a bad chance of being able to effectually resist invasion. The Government had been induced to take an interest in aviation recently, as was shown by the purchase of airships, but whether they would find sufficient funds and a department for the development of the science remained to be seen. He was pleased to see that Birmingham was doing all it could to promote aviation. Birmingham, of course, ought to be a manufacturing centre for flying machines. They were well supplied with other industries whose resources could be utilised in the making of the aeroplanes. He would like to see the time when Birmingham would be able to make aeroplanes better than any country in the world.

Mr. F. H. Pepper, responding, said the Midland Aero Club was one of the pioneer organisations of its kind and the largest in the provinces.

Mr. G. Dennison also replied and made an appeal for vigorous propaganda work on the part of the members during the coming year.

Captain Cooke spoke of interest in aeronautics in the Midlands being at a very low ebb at the time the club was founded. But since then the club had done valuable educational work with the flying meetings organised. In the coming year they were likely to see still greater development in aeronautics, and there was no reason why the club should not be able to continue its policy of advancement.

The remaining toasts were "The Visitors" and "The Chairman."

The musical part of the programme was ably contributed to by Mr. Douglas Wakefield, Mr. Charles Whitworth and the Bohemian Glee Party.

Sheffield & District Ae.C. (22, MOUNT PLEASANT RD., SHARROW)

A SPECIAL course of six lectures on "Mechanical Flight" has been arranged at the Sheffield University, Department of Applied Science, commencing January 13th, 1911, and each following Friday evening on January 20th and 27th, February 3rd, 10th, and 17th, each lecture to commence at 7.30 p.m. Mr. C. Spencer Payne, B.Sc., a member of the club, will deliver the lectures as follows:—

1. "Dirigible Balloons"; 2. "Wind Pressure on Plane Surfaces"; 3. "Monoplanes"; 4. "Biplanes"; 5. "Propellers"; 6. "Aero Engines."

The next general meeting will be held early next year, and will be duly announced in these pages.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Flying Ground, Eastchurch.

ON Thursday, Friday and Saturday last week we were storm-bound, and the monotony of the wind and rain beating against the sheds was occasionally relieved by the roar of an engine. On Sunday it was at last calm ; the absence of rain and only a slight breeze from the north-west made the weather conditions ideal for an attempt for the De Forest Prize.

Sopwith was out before sunrise, and as he made a beautiful practice flight the sun rose. His Howard Wright machine was the same on which he flew for the Michelin Cup, with extensions and large tanks, and an ingenious fabric-covered wind shield protected him from the cold. On the top surface of the shield a rough map was drawn in pencil. On coming to earth he said the machine lifted too slowly with the wind behind him. At 8.30, having filled up his tanks, he started off, head to wind. Rising rapidly, he swept round to the south, and then in order to climb, he headed up to wind and for the space of ten minutes was slowly working up wind, rising rapidly. When he had reached to over 1,000 ft. he headed in a south south-easterly direction again, and at 8.45 was out of sight. Altogether it was a most impressive start.

At 10.30 Jezzi was out on his fast little biplane, but was troubled with the wind, which had now risen to about 15 miles per hour, so he came in again after two or three circuits.

The next appearance was Frank McClean on his Short Green-engined biplane. He made a few circuits in spite of the wind, which was gusty, whilst it was obvious that the machine was not up to the mark, and the engine not turning up to speed.

Grace's Short-Farman needed a few finishing touches, so his first trial did not take place until about one o'clock. Rising against the wind very rapidly he made a large circle over the surrounding marshes, staying up 6 mins. The machine was going well, and about an hour afterwards he started up, and making a much more easterly course than Sopwith was soon out of sight.

His E.N.V. must have been pulling grandly, as he lifted rapidly, with the wind behind him, until he disappeared. We afterwards learned that he averaged 60 miles per hour between Eastchurch and Dover, and attained a height of 2,000 feet.

The machine he is using is a large Farman type Short machine, with extensions and monoplane tail, and ordinary elevator. The landing gear is Short's patent, which has proved itself so strong in practice on rough ground. His engine is a new type E.N.V., with White and Poppe carburettor.

About 3.30 on Sunday afternoon Jezzi went out, flying remarkably well at about 40 ft. from the ground, and at a great speed. His J.A.P. engine runs at over 1,500, and makes a peculiar noise, like a trembler coil very much magnified. Although he was carrying a heavy weight of petrol and oil, his machine seemed to lift easily.

On Monday we did not expect any flying, and were pleasantly surprised to see Dunne bring his machine out. His Green engine was going remarkably well. With a short run he lifted well, but after a few hundred yards appeared to drop, and it is an interesting feature of this machine that as it rises or falls it maintains a more or less horizontal position. This rising and falling appears to be due to passing in and out of either ascending or descending currents, or varying wind velocities which the machine has not time to accommodate itself to, owing to its inertia. When turning, the machine heels over to a considerable angle and seems to lose headway, but on straightening up it regains speed. The Dunne machine has now proved its ability to turn fairly rapidly, and although a complete circular flight was not accomplished, it must be remembered that the wind was strong and gusty. Later he made another interesting flight, but came to earth apparently owing to a down draught.

Brooklands Aerodrome.

THE achievement of "our man Sopwith" is the sole topic of conversation in the "Blue Bird." We thought he would get across the Channel, but to fly 177 miles in the first cross-country flight he has made surpassed our wildest expectations. Much as Brooklands colony love a keen contest, the general hope is that he will not be beaten by later starters. Judging by the weather here, there seems little to fear for him. On the very few occasions when it is not raining or blowing the surface of the waters gives off a vapour in which no self-respecting aeroplane engine will run without protest.

The accident to Mr. Grahame-White's machine tends to confirm the theory often advanced here, during "aviation talks," that "extensions" must tend to instability, inasmuch as fitting them to a properly designed machine turns that machine into one of bad design, altering at once the centres of pressure, lift, gravity and at the same time the "moments."

Very little consideration makes this obvious, even to the uninitiated. Mr. Sopwith's machine nearly turned over, and he said he was thrown out of his seat. Those who have flown biplanes here without extensions in a wind have not felt anything like this. The general consensus of opinion is that the use of extensions is unsound in theory and unsafe in practice.

On Saturday the stock of the Scottish Aeroplane Syndicate was sold by auction, and the results were certainly not encouraging to aeroplane builders who contemplate selling any surplus stock by auction. The "Avis" monoplane, built by Howard Wright, and fitted with a 40-h.p. 8-cylinder Jap, latest type, was knocked down to Mr. Eustace Gray for £50. This machine must have cost to build, a few months back, over £400.

A 30-35-h.p. Green went for £67 10s. after some brisk bidding, and a 3-cylinder Anzani, £27. The sale attracted very few people outside the tenants and their employees. On Sunday, the 18th, Mr. Jenkins took out the Avroplane for a run round, and Mr. Pixton, of the same firm, brought out the new Roe biplane fitted with a 60-h.p. E.N.V., and made several hops. Mr. Morrison on the Gnome-Blériot, and Mr. Gilmour on the Martin-Handasyde, were flying in the afternoon, the latter in a wind of between 20 to 30 miles an hour, recorded by the Dines anemometer.

On Monday, straight flights and rolling were the order of the day, being indulged in by Mr. Low on the Bristol E.N.V., Mr. Pixton on the Avroplane, Mr. Bell on Roe's biplane; Mr. Gilmour piloting the Martin-Handasyde, and Mr. England on the new Weiss, now engined with a 35-h.p. E.N.V. This machine is now fitted with a tail and looks much happier.

Mr. England afterwards made a few straight flights on the Hanriot. Mr. Valentine was rolling on the Empress-Macfie, and M. Ducrocq flew several circuits, at times with passengers.

Tuesday saw the first smash for some time; Mr. England, after making several circuits on the Hanriot, landed in the pond behind the sheds, breaking the chassis.

The other machines out were the Neale VI monoplane, Roe biplane and Martin-Handasyde.

London Aerodrome.

AGAIN owing to the bad weather prevailing during the past week there is very little to report.

On Monday morning it was rather gusty, but the big Valkyrie machine was out and made a short flight. The gusts, however, were too bad to do lengthy flying.

In the evening, the wind having moderated somewhat, a new Valkyrie machine was given its first trial, and found to be in excellent flying order without any adjustment being necessary.

The following day it had been hoped to put another new machine through its trials, but the wind was found to be much too gusty. Valkyrie III, however, was out, and made a nice circular flight, though, owing to the high wind prevailing, the machine was blown out of the aerodrome.

The Banquet of Pilote Aviateurs.

IT has now been arranged that M. Clement Ader will preside at the banquet, at which only certificated pilot aviators will be present, which has been organised by *L'Auto* to take place at the Hotel Continental, Paris, on the last day of this year. Among the large number of those who have so far signified their intention of being present may be mentioned MM. Blériot, Esnault-Pelterie, Louis Paulhan, Rouget, Leblanc, Ladougne, Marcel Hanriot, Nieuport, De Baeder, and Tabuteau. All pilots holding a certificate by any recognised aero club are eligible to be present, and after the banquet they will be invited to the soirée which will also be held in the Hotel Continental.

Aviation in India.

THE first flight in connection with the Allahabad Exhibition was made by Pecquet on the 17th inst., using his Humber biplane. Starting from the Exhibition Grounds he flew across the Ganges and Jumna, round the fort, and so back to the flying ground, the trip being made at a height of about 600 ft. On Monday last some flying was witnessed at Calcutta, when Tyck, who has gone to India with Baron de Caters, started from the Tolbygunge Club Grounds on his Blériot monoplane and made a short flight, attaining a height of 1,200 ft. Among the small group of spectators who witnessed the ascent was General Sir O'M. Creagh, the Commander-in-Chief.

BARON DE FOREST PRIZE.

Mr. Thomas Sopwith's Splendid Flight.

AFTER waiting patiently, and one might say anxiously, in view of the fact that the competition closes next Saturday, the 31st, the various competitors for the Baron de Forest prize who had been watching the weather at different points in the South-East of England were vouchsafed a short spell of calm weather on Sunday last. Mr. Thomas Sopwith, who only comparatively recently has taken up aviation, keenly on the alert, determined at once to take advantage of the change. As will be remembered, he recently had his Howard Wright machine transferred from Brooklands to the Royal Aero Club's ground, at Eastchurch, in the Isle of Sheppey, which point he had fixed upon for "jumping off." Starting from there with the favourable wind at half-past eight on Sunday morning, he headed for Canterbury, gradually rising until when passing over the Cathedral city, he was 950 ft. high. About half an hour from the start Mr. Sopwith was over Dover, by which time he had risen about another 150 feet. Flying perfectly he continued his straight course over the Channel, and in 22 minutes was crossing the French coast line, the passage, by the aid of a favouring breeze, having been made at a speed of close on 60 miles an hour. Mr. Sopwith had fitted a compass to his machine, but as this persisted in sticking at N.W., in whichever direction the machine was steered, Mr. Sopwith backed his own judgment in preference and steered by the sun. After making the French coast a few miles west of Cape Grisnez he intended to steer for Chalons Camp, but the sun electing to hide its rays behind some dense clouds, Mr. Sopwith was left to his own resources, and so continued straight ahead. Without incident he traversed the north-eastern part of France, passing to the south of Lille, continuing on to Valenciennes, reaching soon thereafter the hilly country by the Belgian frontier, where he experienced some nasty gusts of wind. At one time the machine rolled so much that he was thrown out of his seat, but fortunately kept hold of the levers and so righted the machine. The wind continued to be very trying, and with still more mountainous country looming ahead, Mr. Sopwith deemed it wise to descend at the first suitable spot. This proved to be near Beaumont, Hainault, a few miles on the Belgian side of the frontier.

This enforced termination of the grand achievement was the more disappointing as of the 20 gallons of petrol which Mr. Sopwith carried with him he had no less than 11 gallons still left, a sufficient quantity to have easily accomplished a further 300 miles under decent weather conditions. Except for the uncertainty of the country, and the treacherous winds, which were undoubtedly due to the hilly district, not a hitch occurred with either the machine or its gear. The E.N.V. engine went through without a missfire from first to last during the journey of three and a half odd hours, and the only regret is that Mr. Sopwith was unable, by reason of the eccentricities of his compass and the disappearance of the guiding sun, to continue with his original intention of getting to Paris, which would have given him from the start from Eastchurch grounds, a distance of about 240 miles. As to the machine, when Mr. Sopwith alighted within about a kilometre of Beaumont, beyond a couple of farm hands no other help was within reach, and he consequently left his biplane in the middle of the field where he came down until such time as he could send over two of his mechanics to fetch it back, ready, if necessary, for further efforts to ensure his securing the prize against a better performance.

According to the rules of the prize, the distance which counts is that from the point of ascent to the point of descent measured in a straight line as the crow flies, and this in the case of Mr. Sopwith is returned as 177 miles, which was covered in about three hours and a half. The machine with which this magnificent performance was made will be found fully illustrated and described on page 1045.

Other Competitors for the Prize.

SOON after noon on Sunday Mr. Cecil Grace also started from Eastchurch in an attempt for the prize. He was using his Short biplane, and like Mr. Sopwith flew direct for Dover. On nearing there he found a rising wind, and in view of the mist which was hanging over the sea he deemed it expedient to land, a manœuvre which he accomplished safely on Swingate Downs. He had accomplished the 29 mile journey from Eastchurch in about the same number of minutes, and during the trip rose to a height of about 1,000 feet.

During the same day Mr. Grahame-White had his first taste of real misfortune. Having got his Bristol machine repaired from the effects of the gale on Friday night, he had it brought out with a view to making a preliminary trial flight. The wind was said to be blowing at a rate of about 30 miles an hour, but in spite of this Mr. Grahame-White determined to make an attempt at half-past eleven. Rising to a height of about 40 ft. from the Swingate Downs, the machine flew over in the direction of Dover. In the course of carrying out a wide turning movement the machine was caught by a strong gust of wind, and in spite of the aviator's efforts to get it round it was driven sideways by the wind and dropped to the ground from a height of about 40 ft. or so. The machine itself was badly smashed by the fall, but Mr. Grahame-White was able with assistance to crawl out from the wreckage. His face was badly cut, and the aviator within a few minutes fainted from loss of blood. He was, however, taken to the Lord Warden Hotel in a motor car, and there was attended to. Soon after the accident Mr. Grahame-White pluckily expressed his intention of making another attempt to win the prize, and gladly accepted the offer of Sir George White to place another machine at his disposal. On Tuesday he had sufficiently recovered to be able to journey to London, and it is with the greatest satisfaction that we learn there are no bones broken and no serious complications anticipated.

Lieut. Watkins, who is to pilot Capt. Maitland's Howard Wright machine, made a practice flight on Sunday morning at Shorncliffe to test his machine. This proved satisfactory, but in view of the rising wind he determined to postpone his attempt for the prize. On the Tuesday following, in a further attempt, he experienced a slight mishap.

On the previous Friday night Dover was visited by a very severe gale, which blew down the hangars sheltering Mr. Loraine's and Mr. Gresswell's biplanes. Both these machines were very severely damaged, but their owners immediately set to work to get the repairs made, and hoped in spite of their great handicap to make a

Where the "Valkyrie" Aeroplanes of the Aeronautical Syndicate, Ltd., live at the London Aerodrome, near Hendon.—These machines, our readers will remember, are doing daily, when the elements permit, some very fine flying work.

bold try for the prize, Mr. Loraine probably electing to make his start, like Mr. Sopwith, from Eastchurch.

Mr. Frank McClean hopes to make an effort for a win, and Mr. Cody's intention is still to start from Farnborough. Several others are still in the field for a turn, and it may be that after all a "dark horse" will be heard of as having attempted and carried through a performance, if not surpassing, at least worthy of ranking side by side with Tom Sopwith's grand flight.

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BRITISH NOTES OF THE WEEK.

Paper Models. A Request.

THE Editor of FLIGHT will appreciate the courtesy of any readers who will be so kind as to send him actual examples of any simple paper monoplane gliders that have proved really successful.

Mechanics Wanted at Farnborough.

THE work at Farnborough in connection with the three British airships, not to mention "Clement-Bayard"—now known as the "Zeta"—is proving more than the present staff can deal with. In our advertisement columns will be found an announcement that several first-class mechanics are required. The commencing pay offered is 38*s*. 6*d*. per week in addition to clothing, quarters, and rations.

Looking Ahead. Shall We Have Aerial Taxicabs?

IN presiding at the festival dinner of the Cabdrivers' Benevolent Association the other day, the Duke of Rutland said that it is not impossible in the not remote future that those who now flourishingly drive motor cabs may be threatened with an aerial cab competition. Those who now make their living by driving public vehicles in the streets may be called upon to take their place at the wheel of an aeroplane in the future.

The Gordon-Bennett Aviation Trophy.

THE American Aero Club is determined to make a bold bid for the Gordon-Bennett Trophy next year, as it is stated they have already sent in a challenge to the Royal Aero Club of Great Britain. Challenges will be received up to February next.

Trade Unions and Aviation.

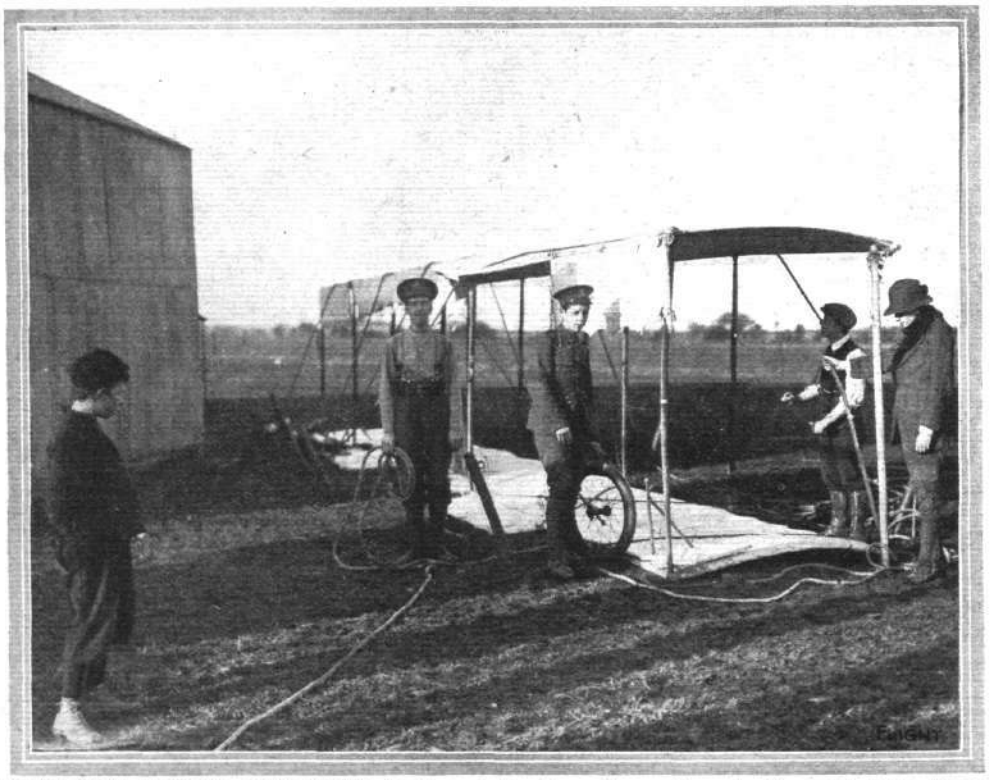
ALTHOUGH the aviation industry in Great Britain is not a very large one at present, it is encouraging to learn that British working men are contending among themselves as to who should construct the machines. It is stated that the Joiners and Carpenters claim that the making of the framework comes legitimately within their province, while the Coachbuilders' Union contend that, as the aeroplane is a conveyance, they should be entrusted with its construction. It will be interesting to watch the result of this little contest.

Blériot Tuition Fees Reduced.

WE understand from Mr. Norbert Chereau, general manager for M. Louis Blériot for the British Empire, that in view of the recent success attained at the various Blériot schools of aviation (one school had eight pupils qualify for certificates in eight days), the price of tuition has been reduced to £32, including the loan of machines as well as expenses of ground and shed. This applies to the first hundred pupils who enter from this date.

Brooklands Mechanics at Dinner.

A CHEERY little function took place at the King's Head, Byfleet, on Thursday evening of last week, when some 38 mechanicians from the various hangars at Brooklands organised a dinner. After a very good menu had been enjoyed, several of those present provided musical and other items for the entertainment of the company.



AFTER THE STORMS LAST WEEK.—Sorting out Mr. Greswell's aeroplane after the wreck of his hangar. Mr. Greswell, who had hoped to have started for the De Forest £4,000 Prize, is standing on the extreme right of the machine.

FOREIGN AVIATION NEWS.

Mr. Farman's New Duration Record.

IT was hard luck that after being in the air for well over eight hours, Mr. Henry Farman in his splendid attempt for the Michelin Cup should have just missed it by a mere bagatelle of a couple of kilometres. It was on Saturday last when Mr. Henry Farman determined to make his attempt, and starting off in spite of the fact that a wind was blowing at the rate of about 25 miles an hour, he kept on flying round and round until he had been in the air for 8 hrs. 12 mins., by which time he had covered 463 kiloms. (288⅝ miles). This compares with the record of 465 kiloms., in 6h. 1m. 20s. made by Maurice Tabuteau on a Maurice Farman machine. Before Mr. Farman had landed dusk had fallen, and he was guided on his way by lamps. During the day he had been kept informed of his progress by means of large figures placed on the ground, but when it became dark he was unable to see them. As he was approaching the point at which he would have beaten the previous distance record the crowd became excited, and cheered so loudly that Mr. Farman thought it was a signal that he had beaten the record, and he therefore came down. Had he made but one more circuit he would have been all right, and naturally he was bitterly disappointed to learn how he had been deceived. Truly a case of "save me from my friends." In his characteristic sportsman-like fashion, however, he at once decided to make another attempt at the first favourable opportunity before the close of the year. Considering the strong wind that was blowing, the distance covered, even in the time established, is in itself a performance of note.

Paris Council and Aviation Motors.

ON the 13th inst. the Chief Committee of the Paris Municipal Council received a deputation from the Ligue Nationale Aerienne, which laid before the Council its arguments in regard to the desirability of encouraging the development of a light motor for aviation purposes, in preference to supporting the proposed aviation tour of France. It was asked that the City of Paris should set apart a sum of between 150,000 and 200,000 francs to enable the organisation of a competition for such motors. It was mentioned that by the aid of such a competition it should be possible to obtain a motor which would only weigh 600 grammes per horse-power.

Air Scouts to Supersede Cavalry.

REPLYING to a deputation from the Aviation Committee of the Senate, General Roques, Director of the French Military Aviation Service, said that he recommended that the number of military aerodromes should be increased, and that the Government should obtain a grant for the purpose. He was of opinion that aeroplanes carrying a steersman, an observer, and a combatant would eventually supersede cavalry for scouting purposes.

Orville Wright in Paris.

HAVING concluded his business in Germany, Mr. Orville Wright arrived in Paris on the 13th inst. for a few days in order to acquaint the French Wright Co. with the latest developments in connection with the Wright biplanes. Interviewed on the subject of the future of aviation, he said that he and his brother never anticipated that flying would so rapidly become as safe as it is now. Provided the pilot exercises proper care and skill, practically no danger at all is presented in flying to-day. Besides being a great sport, he thinks aviation has a great commercial future before it, and there should be much progress made in passenger-carrying machines. He sees no reason why they should not be built to carry ten or twelve passengers, and for cross-country work the aeroplane will always be superior to the road machine. No doubt aeroplanes of the near future will have comfortable sheltered quarters for passengers.

Paris to Brussels and Back.

THREE further entries are announced by the Automobile Club of France as having been received for the Grand Prix d'Aviation, which comprises the journey from Paris to Brussels and back. Numbers 11 and 12 are Gnome-motored Farman biplanes entered by Alfred Lanser and G. Legagneaux respectively, while No. 13 is a Deperdussin monoplane fitted with a Gnome motor entered by G. Busson. This machine is said to be capable of a speed of 100 kiloms. an hour. Aubrun is also practising at Etampes with a view to competing for the prize on a Gnome-engined Blériot which is also credited with being able to do 100 kiloms. an hour.

Sommer also after the Michelin Cup.

WITH a view to competing for the French Michelin Cup, Roger Sommer has just completed a new biplane which he is now testing. It has been designed to carry a load of 400 kilogs., including 250 litres of petrol and 80 litres of oil, a sufficient quantity for a trip of 10 hours duration.

A Flying Meeting at Kiel.

IN connection with the suggested cross-country flight from Kiel to Berlin next June it is proposed to organise a national flying meeting at Kiel from June 18th to 23rd. The race from Kiel to Berlin, with a stop *en route* at Hamburg, will take place on June 24th.

Aerial Lightships.

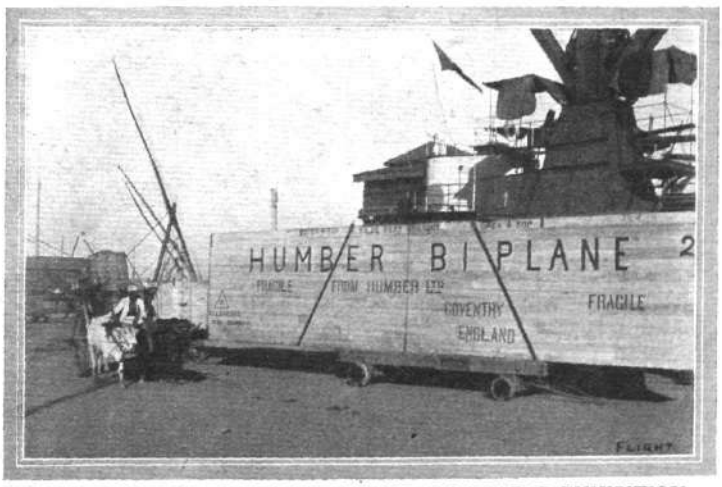
EXPERIMENTS have bean carried out recently at Johannisthal with small captive balloons carrying lights, and intended for marking routes for aerial navigation. The balloons tested were of various sizes, ranging from 3½ ft. in diameter to 8 ft., and the lamps they carried were lighted by electricity supplied by a wire communicating with the earth. It is stated that the lights were visible for a distance of six miles.

German Emperor and Aviation.

THE reports which recently appeared in the French Press that the Kaiser was inclined to be sceptical regarding the practical use of aeroplanes are denied in Berlin. It is stated that the exact opposite is really the case, and that the German Emperor is studying the problem very closely and is also encouraging Naval and Military officers to do the same.

Barney Oldfield *v.* Archie Hoxsey.

NOW that Barney Oldfield has been suspended by the American Automobile Association, he has been seeking fresh fields to conquer. According to a cablegram from New York he has concluded arrangements with Archie Hoxsey for a series of "stunts" in Australia. These two daring pilots of their respective machines will make a tour of the Commonwealth and engage in a series of matches, the latter manipulating his Wright biplane and the former mounted on a powerful motor car.



HUMBER BIPLANES IN INDIA AT THE ALLAHABAD EXHIBITION.—Unshipping the cases, of which there were sixteen, measuring end on 170 feet. These machines have been taken out by Mr. Windham, who is in charge of the flying exhibitions under arrangement with the Exhibition authorities. Note the yoked oxen to the native land vehicle.

THE BLOOD PRESSURE OF AVIATORS.

(By permission, from the "Lancet.")

THE wonderful triumphs of the new art of aviation have directed attention to the mechanics of the aeroplane, but the equally new problem of the physiological effects upon the aviator seems to have attracted little notice. The rapid ascent to great altitudes exposes the body to conditions different from any terrestrial ones. Mountain climbing offers some analogy, but it differs in the fact that the transition from the high atmospheric pressure of the sea-level to a low pressure takes place much more slowly. In the *Gazette Hebdomadaire des Sciences Médicales de Bordeaux* of September 25th Professor R. Moulinier has reported some interesting observations on the blood pressure of aviators who have ascended to high altitudes. On alighting after ascending to a height of 1,200 to 2,000 metres the aviator presents cyanosis of the extremities, probably from the low temperature of the high regions of the atmosphere. Often there is congestion of the conjunctivæ. The pulse is slightly accelerated, but there is no palpitation, arrhythmia, or epistaxis. There is often slight and transient headache and tinnitus aurium. Sometimes there is a tendency to sleep, and this may be felt even during flight. After the flight the blood pressure is always increased. In one aviator at 5.30 p.m., before flight, the constant blood pressure in the radial artery was found with Pachon's sphygmometer to be 9 centimetres of mercury and the maximum pressure to be 18 centimetres; the pulse was 70. At 6 p.m., after a flight of 25 minutes, during which at the twentieth minute he reached the height of 1,100 metres, the constant pressure was 12 centimetres of mercury and the maximum pressure 19 centimetres; the pulse was 80. This increase in pressure is all the more remarkable as the aviators were athletes in full training. The rise was less marked in aviators who were fatigued. These showed palpitation of the heart and marked acceleration of the pulse (108). In one case troublesome tachycardia, symptomatic of functional insufficiency of the heart, and vertiginous movements, were observed in an aviator who, after a flight of an hour, had reached the height of 1,000 metres. No rise in blood pressure was found in aviators who flew at low altitudes, such as 100 to 150 metres. As to the cause of the rise in blood pressure, Professor Moulinier puts forward the hypothesis that it is due to the sudden descent to earth in four or five minutes from a height of 1,000 to 2,000 metres which was attained in 20 to 25 minutes. At a height of 2,000 metres the atmospheric pressure is 591 millimetres of mercury, at the sea level 760 millimetres. In the short time of the descent the circulatory system had not time to become adapted to the change of pressure. He therefore advises aviators to descend more slowly. He also points out the dangerous fatigue to which flight at high altitudes exposes the circulatory apparatus by provoking increased and irregular activity of the heart and vessels. A sound heart and supple arteries are absolutely necessary to an aviator. The list of distressing fatalities to aviators has become comparatively long in a very short time. The accidents are always attributed to some mechanical cause—some breakdown in the machine or unexpected current of air. No doubt this is usually true, but it seems to us quite possible that in some cases the breakdown may have been in the human machine, which is exposed to a new and peculiar stress, both physical and psychical. It is curious that this point does not seem to have received attention.

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AIRSHIP AND BALLOON NEWS.

"Ville de Pau" in Service Again.

THE Astra-built dirigible "Ville de Pau" has been taken down to the South of France for the winter and reinflated. On the 16th inst. the first ascent of the winter season was made and the dirigible cruised over the town for about an hour. Two ascents with passengers were made on Tuesday.

The Belgian Military Dirigibles.

THE airship "Ville de Bruxelles" has been kept waiting in the large hangar at Etterbeck for a spell of fine weather to enable the last trip of the year, from Brussels to Namur and back, to be made. As soon as this trip has been carried out the airship will be deflated and thoroughly overhauled in preparation for next season, when it in all probability will take part in the Army manœuvres. The airship "Belgique III" will shortly be taken to Etterbeck and dismantled for overhauling with a view to its also taking part in next year's manœuvres.

New Gross Military Dirigible.

THE new German dirigible of the Gross type, to be designated "M IV," which is now nearing completion, will have one gas envelope 94 metres in length and of a capacity of 8,500 cubic metres. Two cars will be fitted each containing a six-cylinder Koerting motor of 200-h.p. driving two propellers.

Long-distance Ballooning.

LEAVING London on Sunday afternoon in her balloon, the Hon. Mrs. Assheton-Harbord, accompanied by Mr. C. F. Pollock and Capt. Sartorius, landed an Monday morning at La Chatre, Indre, about 130 miles due south of Paris. The attempt was made in connection with the competition for the Aero's Club's Challenge Cup.

⊛ ⊛ ⊛ ⊛

Oxy-Acetylene Welding.

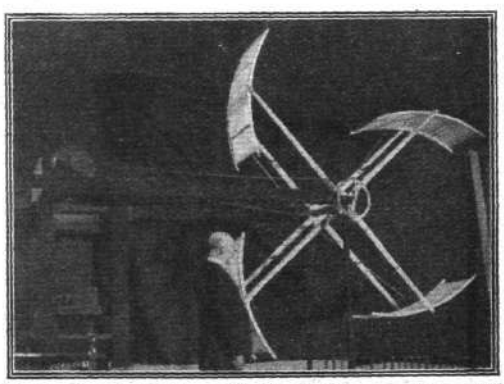
AMONG the firms who have devoted considerable attention to the design of oxy-acetylene apparatus for use in connection with aeroplane construction is Messrs. McGowan, Wild and Co., of Birmingham. The system adopted is that of carbide to water, the carbide being automatically fed and completely immersed in water and the gas passing through water into an accumulator. A feature of the generators made by this firm is that all joints in the apparatus are welded by the same process for which they are made, thus avoiding any leaky joints, &c. The blow-pipe used is also a special construction and designed so as to be particularly suitable of a welding of thin tubular work. The sets are made in various sizes, the smallest being arranged on wheels for ease in moving from place to place.

⊛ ⊛

"CLARUS" ALUMINIUM ALLOY.

"CLARUS" is the registered name of a new aluminium alloy patented by Messrs. Gabriel and Co., of Birmingham, the special features of which are that it is considerably stronger than ordinary aluminium although its weight does not exceed one-third of that of brass. Whether used for castings or whether made up into the form of tubes, sheets, or wire it readily takes a high polish closely resembling silver in appearance, and is not readily tarnished by atmospheric action upon it. As regards its relative strength this is approximately 60 per cent. in excess of that of ordinary aluminium, while owing to its greater density it is, we hear, apt when being cast to be freer from air-bubbles or other defects than is the case with pure aluminium. Needless to state its lesser brittleness is greatly in its favour; and as far as can be seen it is eminently suited for quite a considerable percentage of the fittings on motor cars and upon aerial craft.

Official tests with some "Clarus" tubes show the tensile strength to be in the order of 17 tons per square inch, as against 10 tons for ordinary aluminium tube; and similarly with "Clarus" wire a tensile strength of nearly 40,000 lbs. per square inch was obtained, as against anything from 23,000 to 28,000 lbs. with aluminium wire. Its expansion and contraction over wide variations of temperature appear to be comparatively small; and at the present time experiments are being conducted with aluminium solder which cause it confidently to be anticipated that "Clarus" is considerably more readily soldered than aluminium.



Mr. Joseph Clarkson's model direct lifting machine. The diameter is 8 ft., and it supports 12½ lbs. for an expenditure of ·4-h.p.

CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

Correspondents communicating with regard to letters which they have read in FLIGHT, would much facilitate ready reference by quoting the number of each such letter.

NOTE.—*Owing to the great mass of valuable and interesting correspondence which we receive, immediate publication is impossible, but each letter will appear practically in sequence and at the earliest possible moment.*

CAN WE FLY FASTER?

[970] *Re* (915), I thank "Well-wisher" for his comments on my letter. He is quite right as to the bottom of the car giving a lift, it does give an appreciable lift, and, as in a boat, the closing up of the stream behind it after the greatest diameter of the car has passed gives a thrust. In my models I accentuate this thrust by placing two tractor screws, one on each side of the car, just aft of the greatest diameter. I am now building a model—I think the tenth—5 ft. long, so as to get some idea of the thrust and horse-power required for a full-sized machine, and will send further particulars as soon as experiments are complete.

Manchester Street. W. LE MAÎTRE.

SMALL MONOPLANE.

[971] Having been a reader of FLIGHT for some months, I thought I would take the opportunity of asking you a few questions about a small monoplane I am building. Do you think a 4 or 6-h.p. motor cycle engine will drive it? The size is as follows: total length, 22 ft.; total width, 22 ft.; width of planes, 4 ft. 6 ins. It has 114 sq. ft. supporting surface.

E. Grinstead. A. BINGHAM.

[It is invoking great difficulty to attempt to fly with low powers, and there is certainly no justification for believing that a man-carrying machine of only 114 sq. ft. surface could be successful with 6-h.p.—ED.]

THE MILITARY FARMAN.

[972] With greatest deference I beg to challenge Mr. Roe's statement (927) that "the standard Military Farman, which is nothing but the ordinary Farman with extended planes, has been made successfully by several English manufacturers."

Clapham Common. ALAN BUCHANAN (Paulhan's British Mechanic).

AERODYNAMIC RESISTANCE.

[973] Permit me to again encroach on your valuable space, to further pursue the philosophy of the problem of aerodynamic support as indicated in my letter of August 6th last, and published under No. 847 in your issue of October 29th.

My closing words, "when once in motion," in this letter, admits Newton's law, and the initial launching of the aeroplane in the air, or which is the same, the initial creation of the wave, of course, requires the exercise of a force. This force, if constantly applied, would justify the h.p. formula you give, but in such case would mean a continuous reproduction of the wave. But the wave, once created, travels in the direction (and the opposite) of the plane, and it is now my contention that the plane rides upon the crest of this wave, which when once created needs only to be maintained by the compensation of its energy losses, due to internal friction in the wave itself.

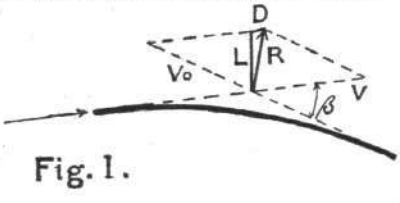


Fig. I.

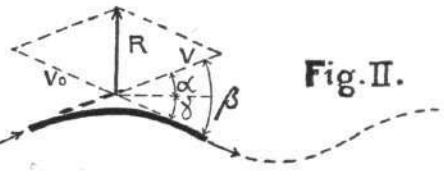


Fig. II.

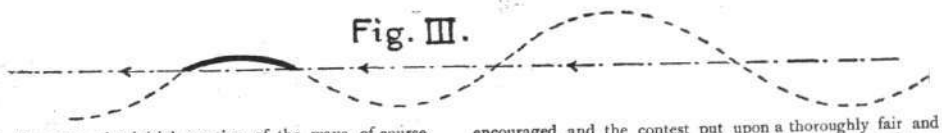


Fig. III.

The character of the wave would, I believe, be something like Fig. III, and my contention would furnish an adequate explanation to the admitted upward trend of the air in front of the plane—otherwise difficult to explain or understand. This upward trend being in reality nothing else but the forefoot—if you will pass the expression—of the wave created some miles away, as the case might be.*

In connection with this problem the case of the steamship is interesting, where the minimum resistance is encountered when the wave travels with the ship, and the maximum resistance when the ship is faster or slower than its wave. The former case requiring only a maintenance, the latter more or less constant reproductions of the waves. Whether this possible difference in the speed of the ship and its wave will appear in the case of the aeroplane, I do not know, but it is reasonable to suppose that in this case, where the wave is created for a purpose and by the plane, the relative velocities of plane and wave are equal. However, to complete my case, I may venture the suggestion that a positive or negative drift—respectively represented by α smaller or larger than δ Fig. II.—might be responsible for an acceleration or retardation of the wave in relation to the plane. Equal angles α and δ would then represent maximum efficiency.

In the case of the hydroplane you mention, the problem is of course analogous to that of the aeroplane. And if in both cases the speed (power) is reduced, the *displacement* of water or air is reduced, *i.e.*, less mass of the fluid is for the moment engaged by the planes than is necessary for their dynamic support, with the consequent necessity for them to fall back upon static support more or less.

I believe the above views are original, and I beg to put them forward through the columns of your valued paper in the hope that, right or wrong, they might serve their purpose as a contribution to the knowledge of the problem of flight.

Leeds. E. MEDÉN.

* The suggestion of a wave motion was to my knowledge first published by Dr. Ing. F. Bendemann in an article in "Zeitschrift des Vereines Deutscher Ingenieure," for May 14th, 21st, 28th, and June 4th, 1910, page 857, where Dr. B. refers to the similarity of the wake of the aeroplane to the stern-wave of a ship, and the rise of air in front of the plane to the ship's stem-wave.

THE "DAILY MAIL" PRIZE.

[974] I note your leader this week dealing with the encouragement of "all British" machines in connection with the *Daily Mail* £10,000 race.

As the Royal Aero Club are at present engaged upon the task of drawing up the rules to govern this contest, may I beg to suggest to them a scheme by which the "all British" machine may be encouraged and the contest put upon a thoroughly fair and even basis for all competitors, whether rich firms or independent and oft times impecunious experimenters.

The scheme consists solely of handicapping the various machines according to their predetermined speed through still air (maximum), independent of horse-power or area, monoplane or biplane. This

will give every aviator a thoroughly sporting chance whether he be rich or poor.

By this plan, a machine capable of say 30 m.p.h. through still air should have say 20 hours start over a machine capable of 50 m.p.h., and so on, the exact handicapping of course to be arranged according to the estimated time for the complete circuit by the various machines. In this manner every machine of any type would be evenly matched against the latest of French racers, and the money would stand a chance of being won by the best man, not by the biggest firm, or the private owner with the longest purse, as is now the case. Also every firm and every competitor should be allowed to enter *one machine only*, and that machine to carry its own spares; otherwise a big firm might have a dozen motor cars following their competitor, and by the end of the race might have rebuilt their machine some half-dozen times.

"Fair play is a jewel" says the old saw, therefore let us act upon it for once, and allow every man an equal chance with his neighbour. Handicapping is the rule in every form of racing all the world over, why not then in an aerial race? which, unless handicapping is instituted, will be most unfair and unjust. Moreover it is no use to raise the cry of unfairness after the money has been won by some already wealthy Continental firm; now is the time to make the rules.

The only persons who are likely to cavil at such an arrangement are those moneyed individuals who already own fleet machines and who see thereby their own chances of winning the prize greatly decreased. It is for the Royal Aero Club to hold the scales of Justice between these persons and the rank and file of aviators.

Brooklands. E. V. HAMMOND.

GYROSCOPIC EFFECT.

[975] The article recently published by you on the gyrostatic effect of rotary engines and propellers undoubtedly calls attention to a grave source of danger to aeroplanes. Moreover, because of the peculiar though not difficult mathematics of the gyrostat, it is a problem which is likely to be avoided in the early days of a new science. Professor Worthington's "Rotas and Vectors" would undoubtedly help any mathematically-inclined persons who want to pursue the subject, while Ayrton's delightful little book on "Spinning Tops," published by the S.P.C.K., will give much joy to the practically-minded man.

I should like, if I may, to write down one or two ideas which have been in my mind for some time with regard to the use of the gyrostat in the control of aeroplanes. There is no question that at the present time, when it is necessary to a large extent to reduce weight, that the use of an auxiliary gyrostat should be avoided. A fixed gyrostat revolving horizontally would be too "harsh," and at any rate, too heavy to carry if it is to be effective. When aeroplanes get larger and heavier and fly much faster the use of the gyrostat, in conjunction with "hurrying planes," as on the Brennan monorail, will be of use, because I believe I am correct in saying that the weight of a gyrostat necessary to maintain equilibrium does not increase in direct proportion to the weight of the machine; *e.g.*, if the weight of the Brennan experimental car were multiplied by 1,000, the weight of the gyrostats would only be multiplied by 420. For this I am indebted to Professor Perry's address to the Physical Society, as reported in *Nature*, March 12th, 1908. On the large passenger carrying machines of the future it is therefore probable that the gyrostat could be introduced to maintain equilibrium, especially as increase of speed and weight will all be in favour of increased stability. At present it seems to me that the only other solution besides that of the Wright Brothers (which, as you remark, places great strain on the framework of the machine) is to use the rotary engine itself as a gyrostat, and to mount it in such a way as to make it control the machine. Personally, I should place the engine (a Gnome, for example), mounted in a suitable framework, so that its plane of rotation was the perpendicular plane through the direction of motion of the machine. The framework containing the engine would be mounted on freely-moving pivots, so that full play could be given to the precession caused by the gyrostatic effect of the engine itself. This framework could be connected to the ailerons or warping mechanism of the machine, and arranged so as to restore equilibrium. This, of course, only controls lateral equilibrium. Possibly longitudinal equilibrium could be controlled by mounting the propeller in such a manner as to use its gyrostatic effect, though this problem would be complicated by the additional fact that the direction of the resultant thrust of the propeller would change. I have, however, not given any attention to this problem, and will not discuss it further here. To recur to the mounting of the engine it will easily be seen that any canting of the machine will, owing to the precessional effect, cause the framework containing the engine to revolve on its axis, and actuate the ailerons and interconnected rudder. The problem of transmitting the power to the propeller would have to be considered. Since the movement of the framework would be small and instantaneous (for it would maintain equilibrium of the machine by damping out small vibrations before any cumulative effect could obtain), it does not appear that the transmission of power through flexible drive, or properly-arranged cardan joints, ought to be an insuperable engineering problem.

Of course this method of control would have to be arranged so that personal control could be assumed at any moment, and I have myself designed a system of control which meets these requirements. These ideas have been submitted to the Advisory Committee on Aeronautics, but, as our American friends would say, there was "nothing doing." I should be happy to discuss them personally or by letter with any practical aviator who would care to talk about them.

In conclusion may I suggest that the time has surely come when large passenger carrying machines, mechanically controlled, should be built. Personally I would, if I had the means to do so, build a large machine of the multiplane type—with Mr. Roe's triplane as the prototype—fitted with two high-powered rotary engines mounted in a vertical plane as I have suggested in the front of the machine, and in a similar manner to the two gyrostats on Mr. Brennan's monorail (if he would let me so far infringe his patents). The propellers would be placed as in the Wright biplane, and I should want to convince myself that the great length of tail prevalent in modern machines was necessary.

CHRISTOPHER W. C. WHEATLEY.

PADDLES *V.* PROPELLERS.

[976] The letter by Alex. Downie, No. 866, in FLIGHT, has reawakened my interest in his points for the paddle *v.* propeller. My ideas with regard to the advantages of the paddle over the propeller are, to my surprise, just like his, except in respect to assisting lateral stability, as I do not quite understand "eating up" side gusts. I thought the fact of them spinning vertically like a bicycle wheel would assist lateral stability but be adverse to stability in the direction of length; the advantages of turning with speed gears seems very apparent.

I arranged, on paper, a practicable paddle-wheel whose sails, numbering four, should be in operation only for part of a revolution, say, one-third. The position during which they were in operation to be under the control of the operator, or fixed. The adverse resistance of the sails during the two-thirds rev. would not be more than 8 per cent. of the effective one-third. The reason I "dropped" the idea, or at any rate let the "fever heat" cool off, was because I found that the necessary area of the sails would be too great for a reasonable wheel, or that the necessary h.p. used would be too great, at any rate as much as or more than for a propeller.

I based my sizes and h.p. on the fact that in existing successful planes the propeller gives a thrust of 400 lbs. with an engine power of 50-h.p. This I think very good. This thrust will be maintained when travelling at 60 m.p.h. because the engine is not throttled, I suppose, and 60 m.p.h. = 5,280 ft. per min. Therefore h.p. $= \frac{400 \times 5,280}{33,000} = 64$. Where is the loss due to form of propeller? The power must be given up in head resistance and skin friction I expect.

I will explain how I obtained the sizes for the sails and h.p. of engines for paddle-wheels.

According to my text-book ("Whittaker's Mech. Eng. Pocket Book") wind at a velocity of 6,000 ft. per min. gives a pressure on a surface of 1 sq. ft. perpendicular to its line of action of 24 lbs. I require a thrust of 400 lbs. to be given by two paddle-wheels, the mean velocity of whose sails is 6,000 ft. per min. Therefore the required surface will be for each sail $\frac{400}{2} \div 24 = 8\frac{1}{3}$ sq. ft. This would be all right to my fancy for wheel proportion, but the necessary h.p. would be 74. If I increase the sail I could decrease the h.p., but not proportionately.

Leeds. F. STANHOPE.

[977] Mr. A. W. Downie's letter, in your issue of November 5th, emphasises the fact that "flight" is a misnomer as far as the existing method of propulsion of aerial vessels is concerned—equally erroneous as is the term "sailing" used by the *Daily Telegraph*, November 5th, when referring to Mr. Willows' recent cross-Channel trip in his airship, "sailing in a south-westerly direction."

An aeroplane with a propeller revolving under each wing, as Mr. Downie suggests, would entitle the craft to be termed a flying machine. Almost all our greatest inventions have been learnt following the guidance of nature. Lessons from the structure of birds and beetles seem to be of little value in the eyes of aerial constructors. I am referring to aeroplanes, not airships, the model of which must be taken from the shape, section, and method of propulsion of the fish, the first and last consideration being already

accepted and acted upon. Few realise the value of the elitra, or wing-cases, existing in the beetle family. No one knows what is the action of the wing during flight, though we may safely assert that the insect derives support by the current of air driven on to the cambered elitra by the movement (which is probably very rapid) of the wings beneath. Take, as an example, the heavy stag-beetle, or the more familiar and popular cockchafer; the wing-cases can, when the insect is in flight, be seen to be rigidly set or locked at right angles to the body, the surface area of the elitra in both insects quoted being sufficient to safely sustain their respective weights until reaching ground if the vibration of the wings ceased.

The majority of the fatal accidents among aviators can be traced to the desire to run before being able to walk. When Stephenson put his first engine on the rails he was content with a pace of 10 to 15 miles an hour; in this era of haste we wish to launch our new invention to travel at 60.

With propellers of moderate speed beneath the planes, a safe machine can be constructed. I believe I am correct in stating that such a craft is now under construction, and with its advent the perils of the air will be minimised sufficiently to induce a hesitating public to adopt a method of travel which without question must soon become general.

Sydenham. G. H. LANE.

IS THE HELICOPTER POSSIBLE?

[978] With regard to your correspondent's remarks *re* helicopter flying machines, these are, at any rate at present, not a practicable type of machine as helicopters pure and simple, but given a suitable plane surface as a weight-carrying medium, it appears to me that helical screws could be used to very great advantage in assisting when rising or descending, and for other manœuvres, as providing a more positive and quicker means of handling an aeroplane.

If it were not possible to actually elevate and sustain the necessary load by means of the screws alone, it should be possible by their aid to get up with a much shorter run than at present, and also to sustain oneself in the air at a very much lower flight speed than is now required with the thrust of large diameter screws, of small pitch ratio, helping to maintain and equilibrate the machine if suitably arranged.

This would greatly facilitate the handling of a flying machine, especially for scouting and other observation purposes, and would probably enable the machine to practically hover in the air, or at any rate to descend very slowly, under the sustaining influence of its screws.

I cannot agree with Mr. Reynolds' figuring of the probable necessary weight of such a machine, in fact if, say, two large diameter screws were arranged to *pull* the machine up from the ground, which would probably be found more convenient for constructional purposes, the weight could hang suspended from the axis of each screw, on a light framework similar to the method used on dirigibles.

A smaller propelling screw could be used to acquire velocity to raise the machine from the ground, if assisted by plane surfaces, and powerful vertical screws, and should result in a very quickly rising machine. As a purely direct lift machine, I am of opinion that the ornithopter is the probable type, although I seem to recollect a French helicopter, by one M. Cornu, I believe it was, getting off the ground, but very few particulars were published, and as the experiments were carried out some four years ago nothing very striking can have resulted, or more would have been heard of the machine.

From experiments with my ornithoplanes I have found that a very positive lifting effect can be obtained by flapping wings properly arranged, and I have no doubt that a successful machine of this type will be evolved which will rise straight from the ground. He will be a bold man who can say that anything is impossible in these days of scientific advancement, and every new development in light yet strong metals, improved motive powers, &c., only places more material to the hand of the worker wherewith to attain his end, and render possible the conquest of that elusive element the air.

My ornithoplane No. 2, equipped with a new type of 40–50-h.p. aerial engine, and embodying several of my ideas in this direction, will be out again shortly, and in the meantime I shall be pleased to give particulars of my experiments and the results obtained to anyone who is interested in the above types of flying machines, as I believe that the exchange of ideas on such a subject may often save time and money which would otherwise be wasted in following out useless experiments, and which could be used in advancing along the paths pointed out by the many failures of the past, which have at least resulted in a partial solution of the problem of mechanical flight.

Coventry. WILLIAM A. WEAVER.

MODELS.

RESISTANCE OF CAMBERED PLANES.

[979] I am constructing a monoplane of the "tail" first type. The dimensions of main plane and elevator are 17 ins. by 4½ ins., 8 ins. by 2 ins. respectively, the drawings of which show no camber, and for the main plane no angle of incidence. The machine has two propellers, each 8 ins. in diameter (which seems rather large for the size of planes).

Could you inform me whether a cambered "plane" set at an arbitrary angle of incidence would offer a lesser resistance than a horizontal and camberless plane? I may add that these planes are of the single surface type.

Brixton, S.W. E. J. M.

[The cambered plane would of course offer the greater resistance, but then it would also carry load. The flat plane edge on would carry no load.—ED.]

PROPELLER THRUST ON MODELS.

[980] Am I right in supposing that if a model glides one in six it will need a propeller thrust equal to one-sixth of its own weight to maintain it in the air?

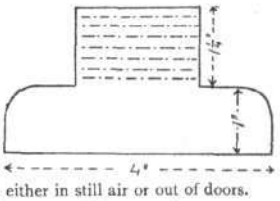
I hope that if I am mistaken someone will clear up the point, for it is one of great importance.

Birmingham. J. A. STONER.

[If a gliding angle of one in six represents a drop of one foot for a horizontal travel of six feet, then the horizontal thrust required for horizontal flight will be one-sixth of the weight supported. Expressed mathematically this is equivalent to saying that the thrust required is equal to W tan γ. It is important to observe that the tangent of the angle must be employed, because the first impression when looking at a diagram is to observe that the thrust in the direction of glide is W sin γ, which is less than W tan γ by an amount that may be very important for steep gliding angles and in full-sized machines.—ED.]

MODEL PAPER GLIDER.

[981] Herewith I enclose rough sketch of a very successful paper glider. The glider is constructed of thick drawing paper, and the weight is obtained by rolling the paper (shown by the dotted lines) into thin strips. A small dihedral angle may be given to the wings. I find it glides exceedingly well, either in still air or out of doors.

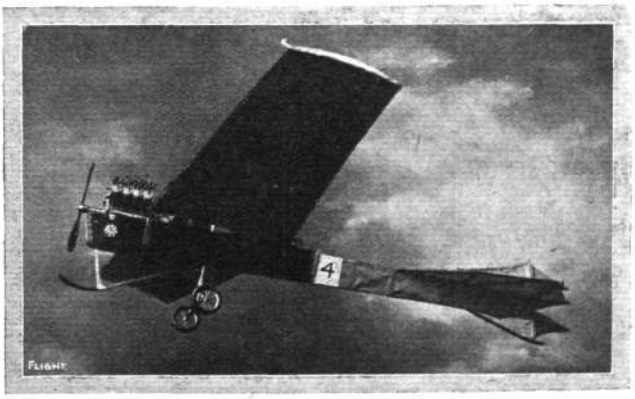


Halifax. WILFRED ROTHWELL.

AN ANTOINETTE.

[982] I enclose photo of a model Antoinette, scale 1 ft. 6 ins. to foot, which I have made. I have to thank your paper for supplying me with most of the detail dimensions, &c.

Chorlton-cum-Hardy. R. M. H. CLEMSON.



Mr. R. M. H. Clemson's Antoinette.

GLIDING MODELS.

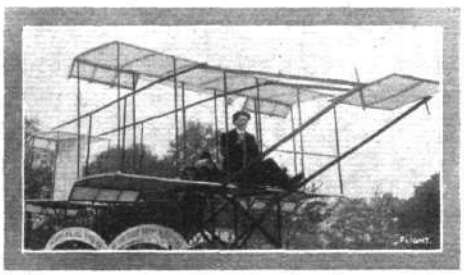
[983] I have just read with interest the article by S. L. Walkden, on "Propellers as Stabilisers," and also letter No. 775, on "Automatic Tails."

I have just completed a model from my own designs, on which I have put three propellers—two for stability and driving, and one, a little larger, being a direct-drive. There is no tail at all, the steering being worked from the front.

I have often noticed in models what your correspondent points out—the difficulty of inducing models to take a gliding position when the propeller action ceases. The model I have made will *glide for 30 or 40 ft. when the propellers stop, and this without a* tail at all. I cannot call it a monoplane, and, of course, it isn't a biplane. I shall have to create a name for it. Shall be pleased to let you have a sketch of it later on.

Blackburn. "ORESTES."

[984] Enclosed I send photographs of model of C. Grahame-White's Henry Farman, which was the first aeroplane to fly over the Midlands. This is a half-size model, and was made by myself and sent round in a procession at Lichfield, and afterwards placed



in the Museum grounds on view, where the photo was taken, and close to the George Hotel, where Mr. Grahame-White and M. Paulhan slept on the night of their stop at Lichfield in the London to Manchester flight.

Whittington. FRANK FOSTER.

DURATION OF MODEL FLIGHTS.

[985] In reference to Mr. Morse Scott's letter (821), in which he seeks information *re* "duration" tests for models, I am pleased to answer his queries as follows: In the numerous contests in which I have acted as a judge, the average duration of flight has been about 20 secs., although it is quite possible under favourable circumstances to obtain flights of half a minute, and even more. With regard to his record query I am sorry to say that "duration" does not receive general recognition as a test, although in my own club, which is, by the way, the oldest model aero club in this country, we adopted it so far back as two years ago. It is heartrending to see at some competitions models flying some hundreds of feet out and back again, and receiving in consequence few or no points. The standard tests we impose on a model are (1) speed, (2) duration, (3) stability, (4) steering, (5) length of flight; which tests secure, I venture to assert, a general all-round excellence.

Surbiton. ROBERT P. GRIMMER
(Sec. Arundel House School Ae.C.).

IMPORTS AND EXPORTS, 1910.

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910).

Imports.	£	Exports.	£	Re-Exportation.	£
January ...	2,516	January ...	750	January ...	550
February ...	437	February ...	2,950	February ...	—
March ...	7,516	March ...	128	March ...	600
April ...	6,305	April ...	950	April ...	1,470
May	846	May	400	May	350
June	7,961	June	642	June	558
July	11,608	July	336	July	830
August ...	6,188	August ...	812	August ...	1,455
September ...	1,034	September ...	4,340	September ...	1,668
October ...	2,816	October ...	670	October ...	2,211
November ...	3,941	November ...	251	November ...	1,655
11 months...	51,168	11 months ..	12,229	11 months...	11,347

RECORDS.

Duration.—Henry Farman (France), at Etampes, on a Henry Farman biplane fitted with a Gnome motor: 8 hrs. 12 mins., covering 463 kiloms. (288¾ miles).

Distance.—Maurice Tabuteau (France), at Etampes, on a Maurice Farman biplane fitted with Renault motor: 465 kiloms. (290 miles) in 6h. 1m. 35s.

Altitude.—G. Legagneux, at Pau, on a Blériot monoplane with Gnome motor: 3,200 metres (10,746 ft.).

Speed.—A. Leblanc (France), on a Blériot monoplane, fitted with Gnome motor, 5 kiloms. in 2 mins. 45⅘ secs. = 108 k.p.h. (67·5 m.p.h.).

Straight Line (not recognised by F.A.I.).—J. Radley (Great Britain), at Lanark, on a Blériot monoplane with Gnome engine: 1 mile in 47⅘ secs. = 75·95 m.p.h.

Aeronautical Patents Published.

Applied for in 1909.

Published December 22nd, 1910.

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27,476. E. PUPIN AND — DENAUS Flying machines.
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